Implementation of the Travel Management Rule

Gila National Forest

Air Quality Specialist Report

Prepared by:

Carolyn Koury
Watershed and Air Program Manager
And
Brian Park
GIS Analyst

for:

Gila National Forest

December 2013

Contents

Tables

Figures

Introduction

Air quality on Forest system lands is potentially affected by land management and development activities both on and off the forest. Air pollution can affect human health, reduce visibility, and contribute to acidic deposition in sensitive, high-elevation locations. This analysis reviews any potential affects for authorized motorized vehicle travel on the Gila National Forest to impact National and State Ambient Air Quality Standards (AAQS), to degrade air quality by more than any applicable Prevention of Significant Deterioration (PSD) increment, to affect Class I Wilderness areas, or to cause or contribute to visibility impairment beyond any existing conditions. Air pollutants related to travel management activities can include vehicle emissions and fine particulate matter created primarily by fugitive dust from vehicle travel over a dry and unpaved road surface. Local and regional air quality is discussed in the following sections as well as a discussion of potential impacts to health (i.e., violating standards) and regional visibility.

Existing Condition

Regulatory Setting

Air quality in New Mexico is governed by a series of federal, state and local laws. These laws are designed to ensure that air quality in the state are in compliance with the Clean Air Act of 1970. The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards for six principal pollutants (carbon monoxide, lead, nitrogen dioxide, particulate matter <10 microns in diameter, particulate matter <2.5 microns in diameter, ozone, sulfur dioxide), which are called "criteria" pollutants (see table 1). Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m3), and micrograms per cubic meter of air (µg/m3). These standards (1) identify a chemical compound, (2) describe a time period for measurement, and (3) define a maximum concentration.

Ambient air quality standards in New Mexico are found in New Mexico Administrative Code (NMAC) 20.2.3 and define the upper limit of a pollutant that can be present in outdoor air without harm to the public's health. They are designed to protect even the most sensitive individuals in nearby communities. These standards represent objectives that will preserve air resources within the state, while recognizing that at certain times, due to unusual meteorological conditions, these standards may be exceeded for short periods of time. Table 2 identifies the NM Ambient Air Quality Standards.

Table 1: National Ambient Air Quality Standards

Pollutant	Primary Standards Level	Primary Standards Averaging Time	Secondary Standards Level	Secondary Standards Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour	None	None
	35 ppm (40 mg/m^3)	1-hour	None	None
Lead	0.15 µg/m^3	Rolling 3-Month Average	Same as Primary	Same as Primary
	1.5 µg/m^3	Quarterly Average	Same as Primary	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	Same as Primary
Particulate Matter (PM_{10}) (particles < 10 microns in diameter)	150 µg/m^3	24-hour	Same as Primary	Same as Primary
Particulate Matter ($PM_{2.5}$) (particles < 2.5 microns in diameter)	15.0 µg/m^3	Annual (Arithmetic Mean)	Same as Primary	Same as Primary
	35 µg/m^3	24-hour	Same as Primary	Same as Primary
Ozone	0.075 ppm (2008 std)	8-hour	Same as Primary	Same as Primary
	0.08 ppm (1997 std)	8-hour	Same as Primary	Same as Primary
	0.12 ppm	1-hour (Applies only in limited areas)	Same as Primary	Same as Primary
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m^3)	3-hour
	0.14 ppm	24-hour	0.5 ppm (1300 µg/m^3)	3-hour

The Freeport-McMoRan Chino Copper Smelter in Grant County, near the Gila National Forest, is currently considered a Sulfur Dioxide (SO2) maintenance area. The maintenance area is defined as a 3.5 mile radius region around the smelter. The maintenance area also includes high elevation areas within an 8-mile radius. The state submitted a State Implementation Plan to the regional EPA headquarters in 1978 and a redesignation plan to the EPA in 2003. The redesignation plan (http://www.nmenv.state.nm.us/aqb/Control_Strat/sip/Grant_Text.pdf) was approved by the EPA in 2003. In 2008 the Hurley smelter stack was demolished, thus there are no further point source emissions from the stack. To date however, the NM Air Quality Bureau has not updated any requirements specific to this SO_2 maintenance area.

Table 2: New Mexico Ambient Air Quality Standards

Pollutant	Averaging Time	New Mexico Standard
Total Suspended Particulates	24 hr	150 ug/m3
	7 day	110 ug/m3
	30 day	90 ug/m3
	Annual geometric mean	60 ug/m3
Carbon Monoxide (CO)	8 hr	8.7 ppm
	1 hr	13.1 ppm
Nitrogen Dioxide (NO_2)	24 hr	0.10 ppm
	Annual arithmetic average	0.05 ppm
Sulfur Dioxide (SO_2)	24 hr	0.10 ppm
>3.5 miles from Chino Mine in Hurley	Annual arithmetic average	0.02 ppm
Sulfur Dioxide(SO_2)	24 hr	0.5 ppm
<3.5 miles from Chino Mine in Hurley (not to be exceeded > 1/yr)	3 hr	0.50 ppm
	Annual arithmetic average	0.03 ppm
Hydrogen Sulfide	1 hr	0.090 ppm
Total Reduced Sulfur	½ hr	0.003 ppm

All areas of the Gila National Forest outside of the Gila Wilderness are considered Class II areas for air quality. Although additional pollutants are limited in Class II areas, they are less protected than Class I areas. In Class II areas, state and federal regulators set emission limits to meet or maintain the Federal criteria pollutant standards and State ambient air quality standards. These emission limits must be complied with to meet the requirements of the Clean Air Act. Class II areas on the Gila National Forest and adjacent lands usually experience ambient pollution levels that limit visibility for many days of the year. Despite this, the Air Quality Bureau of the New Mexico Environment Department (NMED) has not designated any airsheds in or around the Gila National Forest as being in non-attainment of Ambient Air Quality Standards.

Gila Wilderness Areas (Hoadley 2008)

The Gila Wilderness Area was in existence at the time of the passage of the Clean Air Act Amendments of 1977, and thus was designated as a Class I area and provided the highest level of protection from additional air pollution. Under the 1977 CAA, national wilderness areas existing as of August 7, 1977, and that exceeded 5,000 acres in size were designated as “Class I” areas under PSD. Within Class I areas, stringent allowable “increments” or increases in air pollutant concentrations were established and new/modified sources of air pollution are required to demonstrate compliance with these increments in a PSD permit application. The Aldo Leopold and Blue Range Wilderness areas were added to the Wilderness Preservation System in 1980 and are considered Class II areas for air quality because they were not designated until after 1977.

Air Quality Values at Risk

The Federal Land Managers Air Quality Values Related Workgroup identified in their Revised Phase I Report (FLAG, 2010) that the three areas of greatest concern for air quality in Class I and II areas under their jurisdiction remain 1) visibility impairment, 2) ozone effects on vegetation, and 3) effects of pollutant deposition on soils, lichen, and surface waters. Air Quality Related Values (AQRV) at risk from these threats includes flora, fauna, odor, water, soils, geologic features and cultural resources. For established Air Quality Related Values (Blankenship, 1990a), visibility in the Class I airshed of the Gila Wilderness is regulated by the Regional Haze Rule. All remaining private and public lands (including the remaining wildernesses) outside of those listed are designated as Class II. The main distinction between Class I and Class II areas for Forest Service air quality management purposes is that areas designated as Class I are protected from human-caused degradation of air quality through the Prevention of Significant Deterioration (PSD) permitting program. Although the responsibility of the Forest Service to protect air quality values in all wilderness areas is the same, regardless of whether areas are Class I or Class II, it is the agency's ability to affect change using the protective framework in place for Class I areas that differs.

Pollution Sources

Prevailing winds on the Gila National Forest are generally from the southwest though they may shift to easterly during the summer monsoon. Primary pollution sources are therefore most likely located in Southeast Arizona, Southwest New Mexico and extreme West Texas. Pollutants are also likely being transported across the border from Mexico. Table 3 shows the sources contributing the largest emissions in the vicinity of the three wilderness areas in 1999 (EPA, http://www.epa.gov/air/data/geosel.html). Some of the large smelters in this area have gone out of operation since 1999; however, the Asarco plant in El Paso has recently been granted approval for a renewal of their air quality permit from the state of Texas and may soon return to operation.

Table 3: Emissions in Tons per year from sources in Greenlee, Graham, and Cochise counties in Arizona; Catron, Grant, Hidalgo, Luna, and Dona Ana counties in New Mexico and El Paso and Hudspeth counties in Texas (1999 data)

CO	NOx	VOC	SO_2	$PM_{2.5}$	PM_{10}	NH_3	Facility	County	State	Industry
1,720	146	22.9	46.3	121	125		Phelps Dodge El Paso Operations	El Paso Co	TX	3331 - Primary Copper
853	1,067		2.5	25.4	25.4	13.7	Rio Grande Generating Station	Dona Ana Co	NM	4911 - Electric Services
	2,650						Deming Comp Sta	Luna Co	NM	4922 - Natural Gas Transmission
493	6,636	59.7	5,969	718	1,268	3.89	Az Electric Power Cooperative Inc	Cochise Co	AZ	4911 - Electric Services
488	2,628	30.4	7	66.1	66.1	36	El Paso Electric Co	El Paso Co	TX	4911 - Electric Services
	888						Florida Comp Sta	Luna Co	NM	4922 - Natural Gas Transmission
392	632	395	369	105	117		Chevron Usa Products Co	El Paso Co	TX	2911 - Petroleum Refining
	612						Afton Comp Sta	Dona Ana Co	NM	4922 - Natural Gas Transmission
273		264	10.3	1.35	1.92	7.68	White Sands Test Facility	Dona Ana Co	NM	9661 - Space Research And Technology
266	1,088	587	0.84	971	1,826		Phelps Dodge Corporation	Greenlee Co	AZ	1021 - Copper Ores
179	90.3		0.19	7.95	9.88		Border Steel Inc	El Paso Co	TX	3312 - Blast Furnaces And Steel Mills
130	584	377	69.9	98.3	110		Chevron Usa Inc	El Paso Co	TX	2911 - Petroleum Refining
128	358		747	54.1	104	0.1	Chemical Line Company - Douglas Facility	Cochise Co	AZ	3274 - Lime
	144		0.1	2.4	2.4		Wilcox Compressor Station	Cochise Co	AZ	4922 - Natural Gas Transmission
91.1	113		0.2	13	13		El Paso Electric Co	El Paso Co	TX	4911 - Electric Services
60.8	279	9.9	48.6	4.46	4.73		White Sands Missile Range	Dona Ana Co	NM	9711 - National Security
59	272	50.9	2.38	49.8	62.4		Physical Plant Boilers	Dona Ana Co	NM	4911 - Electric Services
45.7	284		0.21				El Paso Natural Gas Co	Hudspeth Co	TX	4922 - Natural Gas Transmission
32.8	39.1		403	26.8	37.5		Asarco Incorporated	El Paso Co	TX	3331 - Primary Copper
30.7	106		18,632	390	524	0.21	Hidalgo Smelter	Hidalgo Co	NM	3331 - Primary Copper
26.2	236		16,068	276	392		Chino Mines	Grant Co	NM	3331 - Primary Copper
15.4	154						El Paso Natural Gas Co	El Paso Co	TX	4922 - Natural Gas Transmission
9.16	680						Lordsburg Comp Sta	Hidalgo Co	NM	4922 - Natural Gas Transmission

Regional Haze - Visibility

Note: The Regional Haze Rule under the Clean Air Act puts forth the regulations discussed in this section. The Gila National Forest contains the Gila Wilderness, which is a Class I Area. Class I Areas receive the highest level of protection for air quality, where prevention of significant deterioration of visibility is mandated by the Clean Air Act. Visibility is monitored at these sites through IMPROVE monitoring sites, one of which is located near the Gila Wilderness. The Gila Wilderness was added to the Interagency Monitoring for Protection of Visual Environments (IMPROVE) network on April 6, 1994. This site is located near the Gila Cliff Dwellings National Monument and the Monument is considered representative of all three wilderness areas (see Figures 1 and 2). Data are currently available on the Visibility Information Exchange Web Site (VIEWS, 2012). IMPROVE monitoring data tracks the quality of visibility conditions and trends in visibility data and are specific to the wilderness areas of interest.

Figure 1: Gila Wilderness Areas

Figure 2: Location of IMPROVE site

Visibility impacts are generally assessed in terms of "natural background" or the expected visibility in the absence of human emission sources. In the southwest visibility is mainly impacted by both fine and coarse particulate matter (FLAG, 2010). The Federal Land Managers responsible for Class I areas have developed natural background visibility estimates for Class I areas (FLAG, 2000). Visibility at the Gila Wilderness site can temporarily be impacted by wildfires and prescribed fires, and from point sources such as the power and mining industry, and emissions from outside the region. Population increases which result in higher emissions from vehicular traffic can also impact air quality related values. While

natural background visibility is currently degraded compared to historic conditions, the trends in visibility have been improving.

Figure 3 shows visibility trends on the best 20 percent of days in Gila Wilderness from 2001 to 2064. The figure includes both monitored and modeled data. The monitored data is from 2001 through 2010. Also shown are modeled baselines established for 2000 to 2004, a baseline for 2005 to 2009, and the visibility improvements required to meet national visibility goals by 2064. In this case, when measured in deciviews (dv), an index in which one unit is equivalent to the change in visibility noticeable by the human eye, visibility on the best days already exceeds the 2064 goal. When measured in light extinction, the current readings are ahead of the glide path (the rate at which improvements must occur in order to meet the 2064 goal) but some further improvement is needed. However, the trend based on both the monitored data and the two baselines are showing progress toward the 2064 visibility goal and are on the trajectory to meet this goal.

Figure 4 shows the visibility trends at Gila Wilderness on the 20 percent worst days. The baselines and projections are based on the same assumptions as in Figure 3, except they are based on the 20% worst days at the Gila Wilderness. Additionally, the glide path necessary to meet the 2064 visibility goals is included. Again the monitored data and the current trend based on this data are below the current glide path. However, some improvements will be required in order to meet the 2064 visibility goal at the Gila Wilderness, whether measured in deciviews or light extinction. However, the trend based on both the monitored data and the two baselines are showing progress toward the 2064 visibility goal and are on the trajectory to meet this goal.

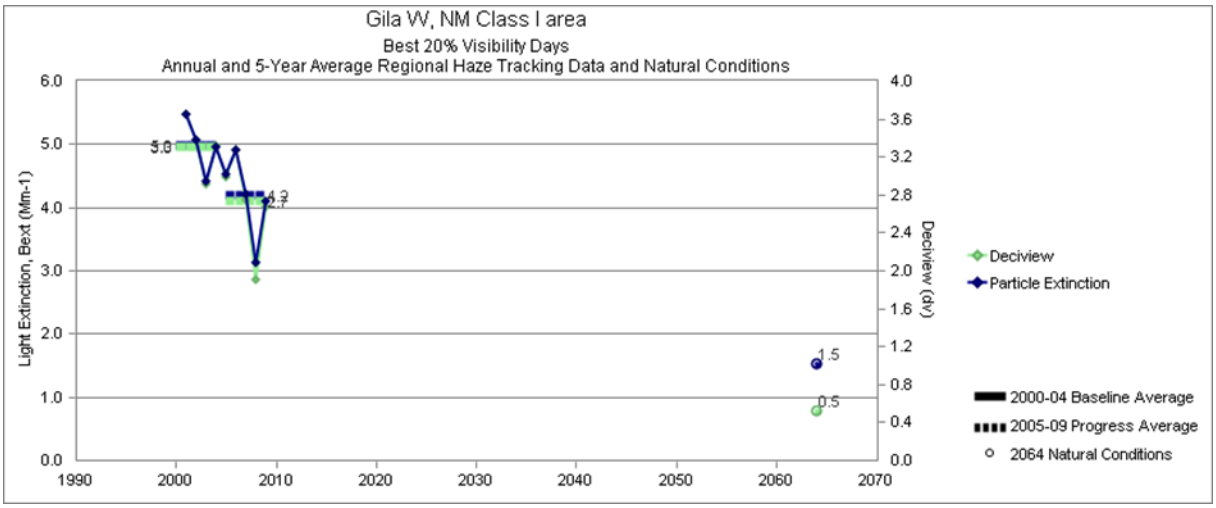

Figure 3: Visibility trends on the 20 percent best days at Gila Wilderness, 2000 through 2064 (VIEWS 2012)

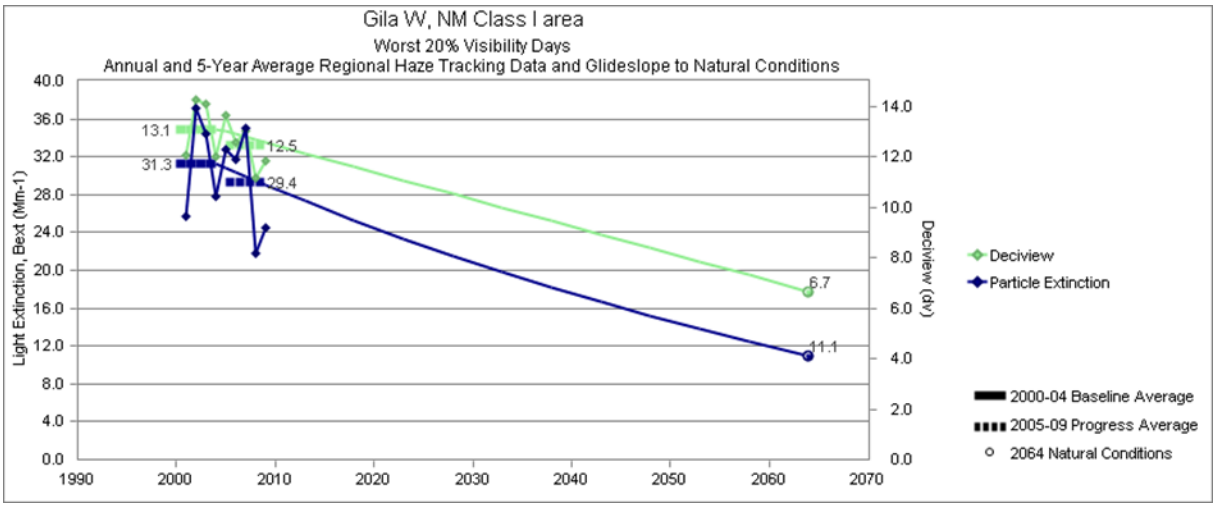

Figure 4: Visibility Trends on the 20% worst days at Gila Wilderness, 2000 through 2064 (VIEWS 2012)

Other Monitoring Data:

Ozone pollution is of added concern because it can stress sensitive ecological systems. Particulate Matter (PM) emissions are generally broken into two categories based on the size of the PM emissions. Fine PM represents the particulate matter emissions sized at or below 2.5 microns in diameter (PM2.5). Coarse PM (CPM) represents the particulate matter emissions sized at or below 10 microns, but above 2.5 microns, in diameter. Smaller sized particles have greater health-related impacts because the smaller particles are more easily inhaled into the lungs.

Since 2007, several of NMED's PM2.5 monitors have been collecting ambient concentrations below the NAAQS. NMED operates two PM10 gravimetric monitors in Grant County (AQS #35-017-1002 and #35-017-1003). Since 2007, these two monitors have reported values which are very low in comparison with the 24-hour NAAQS. See Tables 4 and 5 for recent maximum pollutant concentrations of PM10 and PM2.5 in Grant County.

Table 4. Maximum pollutant concentrations (PM10) monitored near the study area (Silver City, NM), 2008-2011

PM10	24 Hour (ug/m3) Standard = 150 ug/m3
2008	20
2009	28
2010	26

Note: EPA 2011a

Table 5: Maximum pollutant concentrations ($PM_{2.5}$) monitored near the study area (Silver City, NM), 2008-2010

PM2.5	24 Hour (ug/m3) Standard (98th percentile) = 35 ug/m3	Annual (ug/m3) Standard = 15 ug/m3
2008	9.6	5.1
2009	10.8	5.0
2010	11.2	4.5

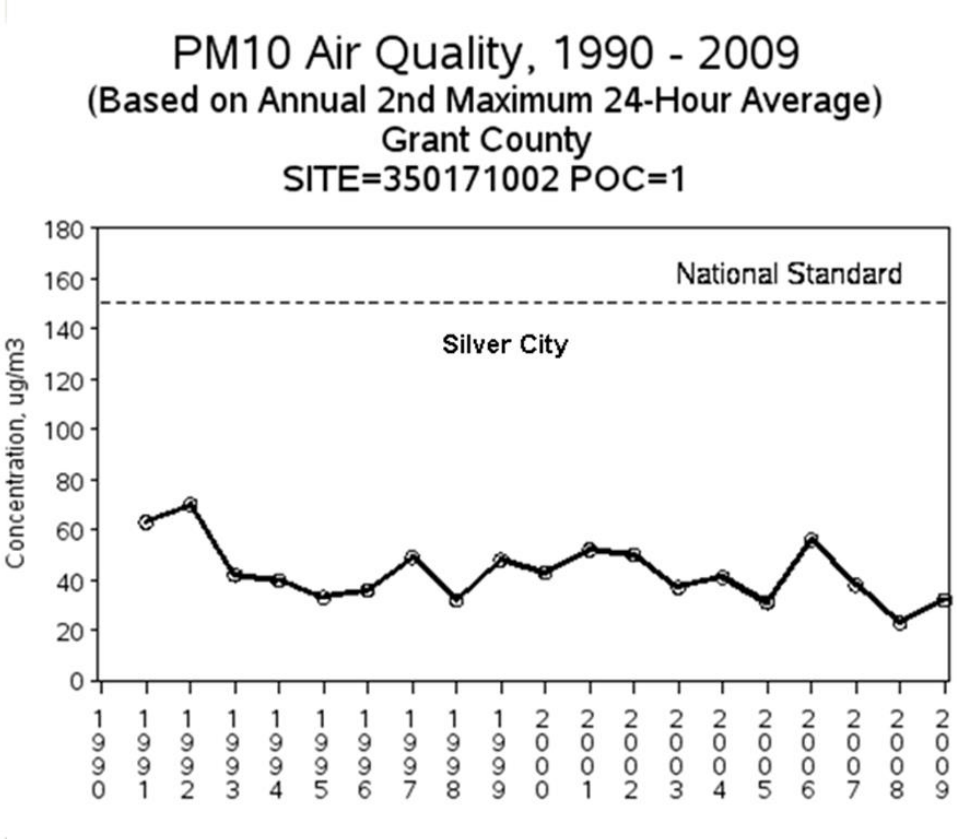

Figure 5: PM_{10} Air Quality 1990-2009 (State of New Mexico, 2013)

Ozone

Ozone is considered a secondary pollutant because it forms on warm sunny days when the primary pollutants nitrogen oxide (NOx) and volatile organic compounds (VOC) are present. In addition to its impact on plant and human health, ozone also contributes to Regional Haze and its subsequent visibility impairment. While other air pollutants may negatively affect vegetation, ozone is recognized as the one most likely to cause damage. Visible damage due to cells may be present in the form of spots or dead areas. Decreased growth or altered carbon allocation may also occur. Ponderosa Pine is one species which is known to be sensitive to ozone in the atmosphere (FLAG, 2000).

Ozone monitors in the Southwestern United States in 2006 indicate that while high concentrations are not generally present in this area, the cumulative impacts are in the moderate range and may be having some impact on ozone sensitive species such as Ponderosa pine.

Deposition

Deposition of acidic pollutants through precipitation can result in acidification of water and soil resources in areas far removed from the source of the pollution. Work is ongoing to determine the sensitivity and critical loads that will cause impacts in some areas. A study in the 1980s found that based on the geology, soils and existing water chemistry the Gila Wilderness had sufficient acid neutralizing capacity to merit a low sensitivity ranking with respect to acid deposition (Blankenship, 1989) related to these resources. However, the acid neutralizing capacity of the Gila Wilderness is likely insufficient for sensitive ecosystem components such as lichen.

A wet deposition monitor is maintained by the New Mexico Environment Department at the Gila Cliff Dwellings National Monument. Data are available from the National Acid Deposition Program website: http://nadp.sws.uiuc.edu/sites/siteinfo.asp?id=NM01&net=NTN

Trend plots for atmospheric aerosols, including both sulfates (SO4)and nitrates (NO3), from the National Acid Deposition site indicate a decrease over the past few years, which may be a result of decreased smelting activities at the Chino Copper Smelter near Silver City.

Smoke Management

The Gila National Forest complies with the New Mexico Smoke Management Program, NMAC 20.2.65 (State of NM, 2005) The Smoke Management Program was developed to protect the health and welfare of New Mexicans from the impacts of smoke from planned and unplanned ignitions, and to meet the requirements of the federal Regional Haze Rule. The Forest is committed to follow the rule and to use tools and information necessary to minimize impacts from smoke. Particulate monitors are often used to measure smoke concentrations, from prescribed fires and wildfires. Smoke from wildland fire can temporarily impact air quality in the region, and at times beyond the region, although air quality is typically very good.

Fugitive Dust

Fugitive dust is primarily lightweight soil particles, including silt and clay that arises to the atmosphere in an unconfined flow stream and become suspended in the air. It typically is a result of mechanical disturbance of granular material, but can also be a result of wind action on exposed soil. Fugitive road dust is a result of motor vehicle use on dry road surfaces. The force of wheels moving across the native surfaces causes pulverization of surface material. Dust is lofted by the rolling wheels as well as by the turbulence caused by the vehicle itself. This air turbulence can persist for a period of time after the vehicle passes. The quantity of dust emissions from a native surface road varies linearly with the volume of traffic. The silt content of the road surface layer, the distance traveled, the weight and speed of the vehicle, average number of wheels per vehicle, the road surface texture, the fraction of road surface material which is classified as silt (particles less than 75 microns in diameter), and the moisture content of the road surface, as well as weather conditions, influence the amount of dust produced. Surfaced roads produce a relatively smaller amount of dust than do native surface roads, especially during dry weather (EPA 2003; Lovich and Bainbridge, 1999).

Although a small amount of fugitive dust occurs naturally, the Environmental Protection Agency (EPA) lists road dust as the largest single source of particulate matter in the air (EPA 2013). The following figures (6-9) illustrate the most recent data for New Mexico.

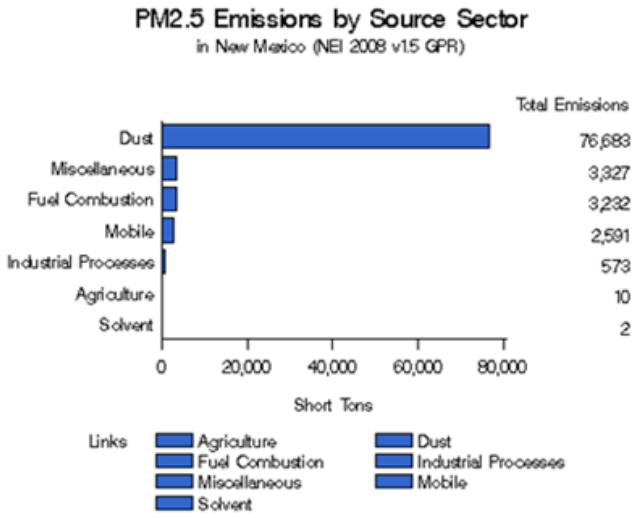

Figure 6: PM2.5 emissions by source sector

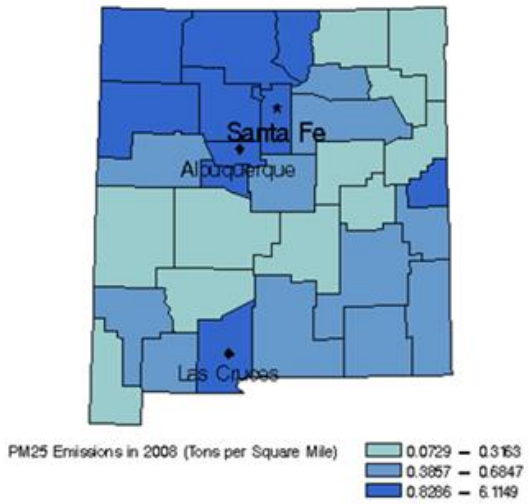

Figure 7: $PM_{2.5}$ emissions in 2008 (tons per square mile)

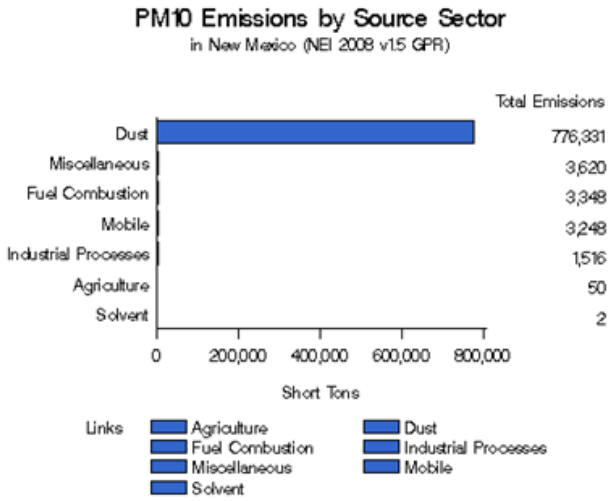

Figure 8: PM_{10} emissions by source sector

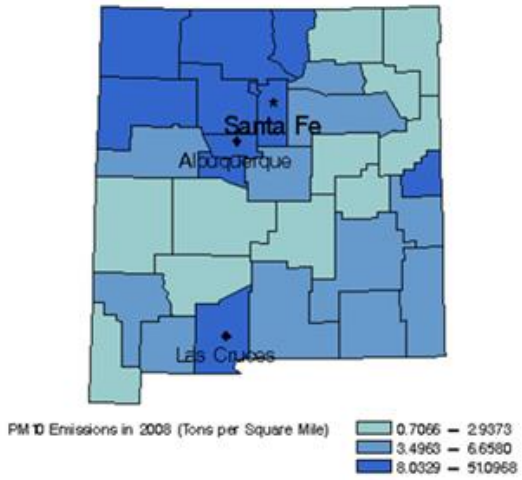

Figure 9: PM_{10} emissions in 2008 (tons per square miles)

Motorized use on dirt roads, in particular during windy weather conditions, can increase fugitive dust levels. Adjacent to roads, dust generated from motorized traffic can cover plants which can interfere with plant growth by clogging pores and reducing light interception. In addition, fugitive dust can cause low visibility on unpaved roads.

A recent study (Painter et al. 2010) indicates that an increased amount of dust in the air over the last century has impacted the longevity of snowpacks, thus leading to changes in the timing and magnitude of stream runoff, in particular in the Upper Colorado River Basin. This relationship is influenced by many factors, including snow accumulations, vegetation cover, and the amount of soil surface disturbance in an area. Currently, there is no data or studies in the geographical area of the Gila National Forest to conclude how much influence fugitive dust has on the smaller snowpacks of these southwestern mountain ranges.

Vehicle Emissions

Vehicle emissions in the project area are most concentrated along federal and state highways. The Forest does not have jurisdiction on vehicle use levels or emissions in any of these concentrated motorized areas. Recreational motorized uses and emissions in the project area are more localized to roads and motorized

trails, with generally sufficient wind dispersion to avoid air quality concerns. The EPA has set standards for emissions of non-road engines and vehicles (snowmobiles, ATVs, boats, etc.). The standards for emissions of oxides of nitrogen (NOx), hydrocarbons (HC), and carbon monoxide (CO) are to ensure compliance with the Clean Air Act, and to regulate those emissions that contribute significantly to the formulation of ozone and carbon monoxide. Compliance with these standards requires manufacturers to apply existing gasoline or diesel engine technologies to varying degrees, depending on the type of engine (US EPA, 2003).

Emissions controls on automobiles have become much more effective in recent years; however emissions from small engines still pose problems to air quality. In particular, OHV emissions from two-stroke engines (many are which are being phased out) do not burn fuel completely and produce significant amounts of airborne contaminants (nitrogen oxides, carbon monoxide, ozone, among other aldehydes, and extremely persistent polycyclic aromatic hydrocarbons (PAH), including the suspected human carcinogen, methyl tert-butyl ether (MTBE) (http://www.arb.ca.gov/msprog/offroad/sm_en_fs.pdf).

Some airborne contaminants settle onto plants or into soils and function as fertilizers, thus causing changes in plant community composition and altering growth rates (Bazzaz & Garbutt, 1988; Ferris & Taylor, 1995, Falkengren-Grerup, 1986; Holzapfel & Schmidt, 1990; Angold, 1997). The accumulation of emissions contaminants has been found in the tissues of plants and animals exposed to them. Prior to the ban on leaded gasoline, lead also was prevalent in plants and animals near paved roads and other travel routes, and because it persists in the environment, it can still have impacts when contaminated soils are mobilized (Ouren et al. 2007). Sulfur dioxide, which can be taken up by vegetation, may result in altered photosynthetic processes (Winner & Atkison, 1986).

OHV emissions also contain a variety of heavy metals, including zinc, copper, nickel, chromium, and lead. In terms of overall quantity, lead was one of the most significant heavy metals emitted prior to the ban on leaded gasoline in 1996 (Daines et al, 1970; Motto et al, 1970; Quarles et al, 1974; Wheeler and Rolfe, 1979). The declining gradient in lead concentrations away from roadsides may be due, in part, to the direction of surface water flow, as soil and other debris to which lead adheres were flushed away by the volume of water that runs off road surfaces. Although lead emissions from gasoline have declined dramatically since control policies were implemented in the 1970s (Forman et al, 2003), it persists in soils and can continue to move through the environment when contaminated soils are dislodged.

Airsheds

The Gila National Forest occupies portions of four designated airsheds in New Mexico. Table 6 outlines the number of Gila National Forest acres within each airshed.

Table 6: Gila National Forest acres within New Mexico airsheds

Airshed	Total Acres in Airshed	GNF Acres within Airshed	% of Forest in Airshed	% of Airshed Occupied by GNF
Lower Rio Grande	3,613,983	290,744	9%	8%
Western Closed	1,997,830	137,191	4%	7%
South-Western Closed	3,999,237	219,672	6%	5%
Lower Colorado River	8,679,673	2,744,899	81%	32%

Figure 10 provides a map of the general locations of the four airsheds that the Gila National Forest occupies.

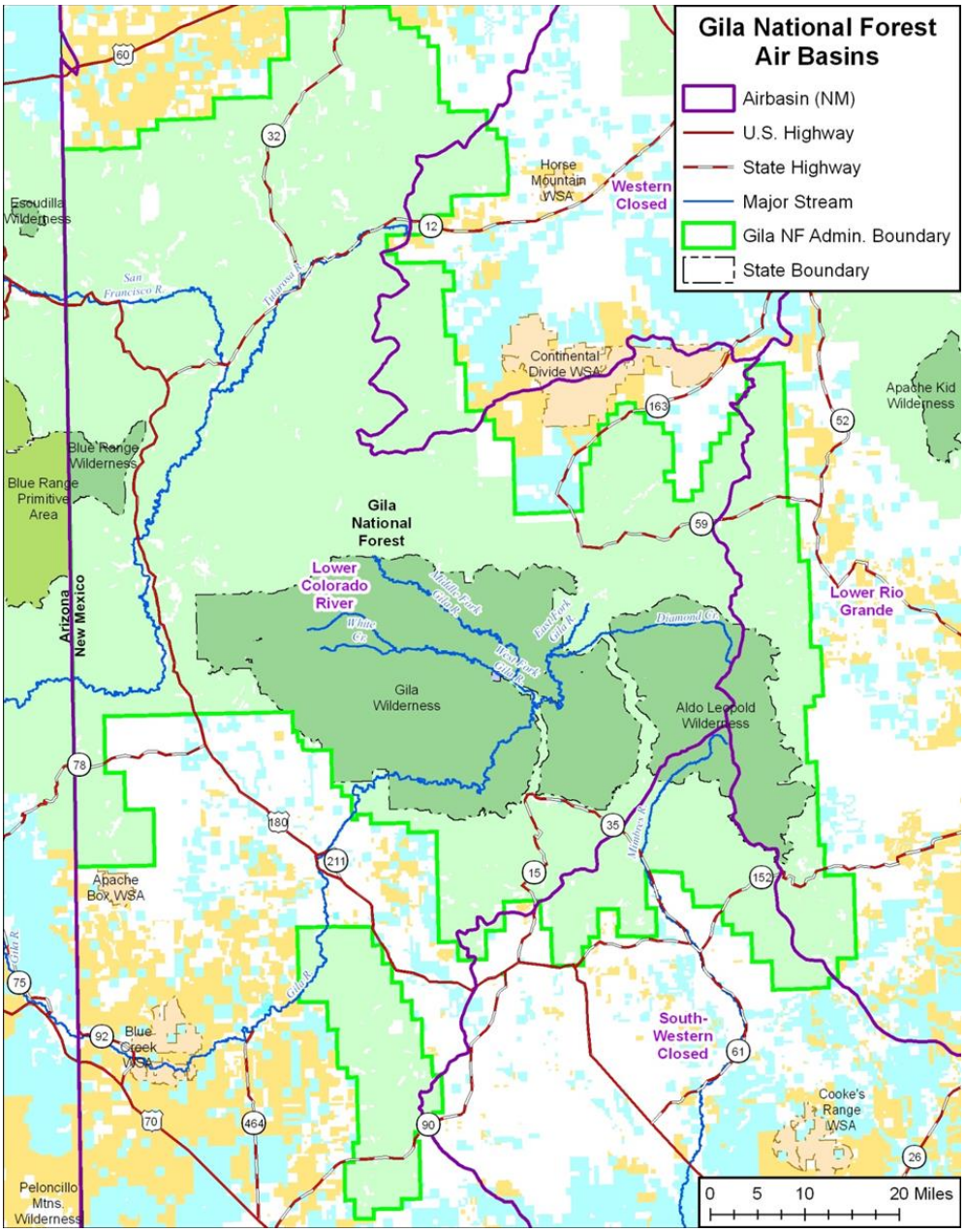

Figure 10: Airsheds of the Gila National Forest

In general, air quality conditions on the Gila National Forest, including the three Wilderness areas are very good and there are no violations of the National Ambient Air Quality Standards. While there is room for improvement, visibility in this area is some of the least impaired in the nation. Primary contributors to visibility reduction include Organic Carbon associated with wildland fire and sulfates from industrial sources such as copper smelting and electric power generation. While there is some indication of elevated Ozone levels, they rarely exceed levels which have been determined to be harmful to vegetation. A cumulative effects index indicates moderate conditions but values are lower than in neighboring areas. Deposition monitoring indicates a decreasing trend in some of the more harmful pollutants.

Climate Change

The U.S. Environmental Protection Agency (EPA) has asserted that scientists know with virtual certainty that human activities are changing the composition of the Earth's atmosphere. It is also documented that "greenhouse" gases, including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and hydrofluorocarbons have been increasing (EPA, 2010). The atmospheric buildup of these gases is largely the result of human activities such as the burning of fossil fuels. Greenhouse gases absorb infrared energy that would otherwise be reflected from the earth. As the infrared energy is absorbed, the air surrounding the earth is heated (CARB 2007).

The Southwestern Region of the Forest Service recently released "Southwestern Region Climate Change – Trends and Forest Planning" in February, 2010. The following information is summarized from excerpts of this publication:

> "In the Southwest, climate modelers agree there is a drying trend that will continue well into the latter part of 21st century (IPCC 2007; Seager et al. 2007). The modelers predict increased precipitation, but believe that the overall balance between precipitation and evaporation would still likely result in an overall decrease in available moisture. Regional drying and warming trends have occurred twice during the 20th century (1930s Dust Bowl, and the 1950s Southwest Drought). The current drought conditions "may very well become the new climatology of the American Southwest within a time frame of years to decades". According to recent modeling, the slight warming trend observed in the last 100 years in the Southwest may continue into the next century, with the greatest warming to occur during winter. These climate models depict temperatures rising approximately 5 to 8 degrees Fahrenheit by the end of the century (IPCC 2007). This trend would increase pressures on the region's already limited water supplies, as well as increase energy demand, alter fire regimes and ecosystems, create risks for human health, and affect agriculture.
>
> Average air temperatures are rising, and it is likely that continued warming will accentuate the temperature difference between the Southwest and the tropical Pacific Ocean, enhancing the strength of the westerly winds that carry moist air from the tropics into the Southwest during the monsoon. This scenario may increase the monsoon's intensity, or its duration, or both, in which case floods will occur with greater frequency (Guido 2008). While the region is expected to dry out, it is likely to see larger, more destructive flooding. Along with storms in general, hurricanes and other tropical cyclones are projected to become more intense overall. Arizona and New Mexico typically receive 10 percent or more of their annual precipitation from storms that begin as tropical cyclones in the Pacific Ocean. In fact, some of the largest floods in the Southwest have occurred when a remnant tropical storm hit a frontal storm from the north or northwest, providing energy to empower a remnant tropical storm (Guido 2008).
>
> Most global climate models are not yet precise enough to apply to land management at the ecoregional or National Forest scale. This limits regional and forest-specific analysis of the potential effects from climate change."

Due to the limitations of climate models, as stated above, site-specific analysis of climate change at the Forest level in regards to implementing the travel management rule remains improbable. Several unknowns further limit the discussion and analysis. These include lack of data regarding traffic numbers and projected increases or decreases in motorized visitors or passersby to the Forest, limited data and knowledge of current effects to ecosystem resiliency within the Forest as a result of motorized travel, and limited knowledge of surrounding areas' contributions to current and future climate impacts to assess cumulative effects.

A new U.S. Forest Service report predicts that most of the Southwest, parts of California and the southern and central Great Plains will be the most vulnerable areas in the nation to water shortages during the next 60 years. The report, "Vulnerability of U.S. Water Supply to Shortage: A Technical Document Supporting the Forest Service 2010 RPA Assessment" (Foti et al. 2012), affirmed that of 98 river basin assessments across the U.S., the arid and semi-arid regions of the nation are the most vulnerable areas to future water shortages. Although the detailed results differ depending on which scenario is simulated and which climate model is used, the general finding of increasing and substantial vulnerability in the Southwest holds true in all cases.

The National Climate Assessment Development Advisory Committee (NCADAC) has overseen the development of a Draft Climate Report that was recently released for public comment (January 2013). Summarized below are some of the findings from the report.

> "The Southwest is the hottest and driest region in the U.S., where the availability of water has defined its landscapes, history of human settlement, and modern economy. Climate changes pose challenges for an already parched region that is expected to get hotter and, in its southern half, significantly drier. Widespread tree death and fires, which already have caused billions of dollars in economic losses, are projected to increase, forcing wholesale changes to forest types, landscapes, and the communities that depend on them. Climate change is increasing the vulnerability of forests to ecosystem change and tree mortality through fire, insect infestations, drought, and disease outbreaks. Western U.S. forests are particularly vulnerable to increased wildfire and insect outbreaks.
>
> Factors affecting tree death, such as drought, higher temperatures, and/or pests and pathogens, are often interrelated, which means that isolating a single cause of mortality is rare (Allen et al. 2010; Dukes et al. 2009; McDowell et al. 2008). However, rates of tree mortality due to one or more of these factors have increased with higher temperatures in western forests (Van Mantgem et al. 2009; Williams et al. 2010) and are well correlated with both rising temperatures and associated increases in evaporative water demand (Williams et al. 2012). Trees die faster when higher temperatures accompany drought; thus a shorter drought can trigger mortality. Short droughts occur more frequently than long droughts, therefore the direct effect of rising temperatures, without a change in drought frequency, could result in substantially greater mortality (Adams et al. 2009). Western forests are currently considered limited by moisture and thereby highly susceptible to future changes in environmental conditions.
>
> Fire naturally shapes southwestern landscapes. Indeed, many Southwest ecosystems depend on periodic wildfire to maintain healthy tree densities, enable seeds to germinate, and reduce pests (Bowman et al. 2009; Keeley and Zedler 2009). Excessive wildfire destroys homes, exposes slopes to erosion and landslides, threatens public health, and causes economic damage (Frisvold et al. 2011; Morton and Global Institute of Sustainable Forestry 2003; Richardson et al. 2011; WFLC 2010). Given strong relationships between climate and fire, even when modified by land use and management, projected climate changes suggest that western forests in the United States will be increasingly affected by large and intense fires that occur more frequently (Bowman et al. 2009; Keane et al. 2009; Littell et al. 2009; Westerling et al. 2011; Williams et al. 2010)."

Projected future climate change may affect New Mexico in a variety of ways. Public health can suffer due to an increase in extreme temperatures and severe weather events resulting in escalating transmission of infections, disease, and air pollution. Agriculture is vulnerable to altered temperature and rainfall patterns, and new pest problems. Forest ecosystems could face increased fire hazards and may be more susceptible to pests and diseases. Snowpacks could shrink and winter runoff may start in midwinter, not spring, with rain falling on snow triggering flood events.

While the future of climate change and its effects across the Southwest remains uncertain, it is certain that climate variability will continue to occur across the Gila National Forest. Forest management activities should strive for promoting resilience and resistance of natural resources to impacts of climate change. Implementation should focus on maintenance and restoration of resilient native ecosystems, thus reducing the ecosystems' vulnerability to variations in climate. Diversity remains an integral component in these native ecosystems. Manager should avoid situations where one failure does not lead to a domino effect. Projects must promote connected landscapes and endeavor to reset significantly disrupted animal and plant communities, thus restoring their flexibility to changes in climate. Management across the Forest will have to respond accordingly to climate change to minimize negative impacts from any ongoing or proposed activity.

Laws, Regulations and Policies

Applicable Laws

Clean Air Act of 1963 (77 Stat. 392; 42 U.S.C. 1857) - Gave the Federal government, for the first time, enforcement powers regarding air pollution.

Clean Air Act Amendments of 1970 (84 Stat. 1676; 42 U.S.C. 1857b) - Sharply expanded the Federal role in setting and enforcing ambient air quality standards, including regulating land management practices to achieve and maintain such standards.

Clean Air Act Amendments of 1977 (91 Stat. 685; 42 U.S.C. 7401 et seq.) - Established as a national goal preventing any future impairment, of visibility of Class I areas from man-made air pollution. Class I Federal areas include all International Parks, all National Wilderness Areas that exceed 5,000 acres, all National Memorial Parks that exceed 5,000 acres, and all National Parks that exceed 6,000 acres.

Clean Air Act Amendments of 1990 (P.L. 101-549; 42 U.S.C. 7661f) - EPA established limits on how much of a pollutant can be in the air anywhere in the United States. States are not allowed to have weaker pollution controls than those set for the whole country. States are required to develop state implementation plans (SIPs) that explain how each state enforces the Clean Air Act. A SIP is a collection of the regulations a state will use to clean up polluted areas. EPA must approve each SIP, and if a SIP isn't acceptable, EPA can take over, enforcing the Clean Air Act in that state.

- Approval and Promulgation of Implementation Plan for New Mexico: General Conformity Rules (March 1997) –enable the New Mexico Environment Department to review conformity of all Federal actions (See 40 CFR part 51, subpart W--Determining Conformity of General Federal Actions to State or Federal Implementation Plans) with the control strategy SIPs submitted for the nonattainment and maintenance areas within the State except for actions within the boundaries of Bernalillo County.

Organic Administration Act of 1897 (30 Stat. 34 amended; 16 U.S.C. 473-478, 479-482, 551) - Authorized the Secretary of Agriculture to manage the National Forests to improve and protect the forests, to secure favorable conditions of water flow, and to furnish a continuous supply of timber.

Multiple Use Sustained Yield Act of 1960 (74 Stat. 215; 16 U.S.C. 528-531) - Established a policy of multiple use, sustained yield management for the renewable resources of the National Forest System.

National Environmental Policy Act of 1969 (83 Stat. 852 as amended; 42 U.S.C. 4321, 4331-4335, 4341, 4347) - Required that environmental considerations be incorporated into all Federal policies and activities, and required all Federal agencies to prepare environmental impact statements for any actions significantly affecting the environment.

Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat. 476 as amended; 17 U.S.C. 1600-1614) - Provided for continuing assessment and long-range planning of the Nation's forest and range renewable resources under the jurisdiction of the Secretary of Agriculture.

National Forest Management Act of 1976 (90 Stat. 2949; 16 U.S.C. 472a, 476, 476 (note), 500, 513-516, 521b, 528 (note), 576b, 594-2 (note), 1600 (note), 1600-1602, 1604, 1606, 1608-1614) - Established additional standards and guidelines for managing the National Forests, including directives for National Forest land management planning, and public participation. It is the primary statute governing the administration of national forests.

Gila National Forest Plan Standards and Guidelines (1986)

- Minimize air pollution form land management activities through application and timing of improved management practices (p. 12)
- Prepare air quality and smoke management plans, and review and make recommendations for proposed sources that may impact the Forest's Class I and Class II wilderness areas (p. 43)
- Review and make recommendations for state air quality redesignations for State Implementation Plans (SIPs), Prevention of Significant Deterioration Permits (PSDs), and other air quality issues. (p. 43)
- Develop and initiate, within the first decade, a Forest air resource monitoring plan to evaluate future impacts. (p. 43)

For Gila Wilderness Class I airshed:

- Maintain high quality visual conditions. The form, line, texture, and color of characteristic landscapes will be clearly distinguishable when viewed as middle ground. Cultural resources and ecosystems will remain unmodified by air pollutants. Determine baseline information and the background condition of the above Air Quality Related Values and specify limits of acceptable change that will protect affirmatively these values in class I areas.
- Perform Prevention of Significant Deterioration (PSD) permit application review to determine the potential effect increased emissions from major stationary sources will have on Air Quality Related Values (AQRV) of this National Forest Class I area. Impacts of air pollution generating activities will be predicted using current modeling techniques.

Forest Plan Amendment No. 7 Air Quality Related Values (1992)

Aquatic Resources – Levels of acceptable change:

Acid neutralizing capacity level (based on current level of sensitivity):

Current level	Levels of acceptable change
Sensitive <200 μeq/e	No decrease
Moderately sensitive	
200-400 μeq/e	10% decrease but not less than 200 μeq/e

pH (levels based on current values):

Current level	Level of acceptable change
Less than 6.6 SU	No decrease
6.6 to 7.0 SU	No decrease greater than 0.1 SU
Greater than 7.0 SU	No decrease greater than 0.5 SU and not below 6.8 SU

Terrestrial Resources – Limits of acceptable change:

Lichens – no specific level; periodic monitoring
Soils – base saturation; a change of 10%; cation exchange capacity – a 10% deviation from normal range
Conifer needle longevity – 25% change in needle retention
Ozone injury to Ponderosa pine – concentration recommended by Fox, D.G. (1989, A Screening Procedure to Evaluate Air Pollution Effects on Class I Wilderness Areas)

Visibility (throughout the Class I Gila Wilderness only, year round) – Limits of acceptable change:

Layered haze – a 2% change in contrast;
Uniform haze – a Just Noticeable Change (as measured by extinction).

Forest Service Manual (FSM) 2500 Watershed and Air Management – Chapter 2580 Weather Program (06/1/1990)

2580.2 Objectives

- Protect air quality related values with Class I areas
- Control and minimize air pollutant impact from land management activities
- Cooperate with air regulatory authorities to prevent significant adverse effects of air pollutants and atmospheric deposition on forest and range land resources

2580.3 Policy

- Integrate air resource management objectives into all resource planning and management activities.
- Use cost effect methods of achieving resource management objectives

Forest Service Manual (FSM) 2580 Watershed and Air – Chapter 2580 Air Resource Management (Region 3 Supplement 06/30/2005)

2580.3 Policy

- Minimize the impact of the Region's management activities on air quality and comply with requirements of Federal, state and local air regulatory authorities
- Affirmatively protect Air Quality Related Values (AQRVs) within the Region's Class I wilderness areas.
- Protect Resource Values Affected by Air Pollution (RVAAP) on all National Forest System Lands.
- Maintain or improve air quality within Class I airsheds.

2580.4 Responsibility
2580.4.2 (Forest Supervisors)

e. conduct conformity determinations as required by EPA rule pursuant to Clean Air Act Section 176(c).

f. consult with State and local air quality regulatory authorities on pollution impacts to National Forests. Document written or verbal complaints for Class I area visitors regarding visibility or other AQRV impairment. Forward comments to the permitting authority and recommend actions needed to protect these resources

Executive Order (EO) 11644 (February 8, 1972) and EO 11989 (May 24, 1977) – Provide direction for Federal agencies to establish policies and provide for procedures to control and direct the use of OHVs on public lands so as to: (1) protect the resources of those lands; (2) promote the safety of all users of those lands; and (3) minimize conflicts among the various users on those lands.

- The Forest Service developed regulations in response to the Eos (36 CFR, 219, 261 and 295). Under those regulations, OHV use can be restricted or prohibited to minimize: (1) damage to the soil, vegetation, watershed and impacts to water quality, or other resources of public lands; (2) harm to wildlife or wildlife habitats; and (3) conflict between the use of OHVs and other types of recreation.

New Mexico Air Quality Control Act (Sections 74-2-1 to 74-2-17 NMSA 1978) and New Mexico Ambient Air Quality Standards and Air Quality Control Regulations —provide state and local air quality regulations that affect certain management activities in the Southwestern Region.

Council on Environmental Quality; Regulations for Implementing NEPA; Section 1502.22; Incomplete or unavailable information; [51 FR 15625, Apr. 25, 1986]

When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking.

a) If the incomplete information relevant to reasonably foreseeable significant adverse impacts is essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant, the agency shall include the information in the environmental impact statement.

b) If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement:

1. A statement that such information is incomplete or unavailable;

2. a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment;

3. a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment, and

4. the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.

c) The amended regulation will be applicable to all environmental impact statements for which a Notice of Intent (40 CFR 1508.22) is published in the Federal Register on or after May 27, 1986. For environmental impact statements in progress, agencies may choose to comply with the requirements of either the original or amended regulation.

Methodology and Analysis Process

The analysis area under consideration for direct and indirect air quality impacts is at the landscape level, considering the area within a radius of 62 miles (100 km) from the edge of the project area. NMED's air quality permitting system suggests that sources within a radius of 62 miles be considered, especially those located downwind of the project. Cumulative effects were considered by airshed, taking into accountthe impacts of the alternatives when combined with past, present, and foreseeable future actions and events. Past actions may have no effect if the action is no longer contributing emissions to the air.

Data Sources

Data sources for this analysis included existing surveys, inventories and data bases incorporated into the Gila NF GIS layers:

- Roads, associated maintenance levels, road widths and road miles from the Gila NF Infra Database (see engineering section).
- User created routes inventory (Forest and Public)
- NM air basins (State of New Mexico)

General Assumptions:

- Public education, compliance, and enforcement of regulations will generally limit public travel to designated routes.
- The action alternatives involve the closure of routes to vehicle use by the public and not the physical removal (decommissioning) of roads. The removal of roads typically involves the extraction of culverts, the ripping of the road surface, and in some cases the re-contouring of the ground surface to blend in with the natural topography. It typically can take more than 20 years for closed roads to revegetate to background conditions, if traffic is successfully eliminated.
- Closed routes without fixed barriers are expected to revegetate minimally. These routes will not disappear from the landscape until decommissioned, and will continue to be a minor source of fugitive dust during windy periods. These emissions may vary across the Forest dependent on location of wind events and exposure of the closed routes to the event.

- Miles by traffic use are unknown. Traffic use on maintenance level 2 routes and user-created routes is generally low, and traffic use on maintenance levels 3, 4, and 5 routes is generally moderate.
- An undetermined amount of unauthorized routes exist that are not included in any current inventory.
- Fugitive dust is the major air pollutant from native-surface roads. Other pollutants from roads, such as trace metals and man-made chemicals may be attached to dust. Thus, the relative effects of the alternatives with regard to fugitive dust apply to trace metals and man-made chemicals.
- Pollutants such as smoke, ozone, vehicle emissions, and atmospheric deposition are not analyzed in the effects section as they either do not apply (smoke) to the project or there is insufficient data to analyze.
- The designation of motorized routes does not translate to changes in numbers of motorized vehicles, either full-size or off road vehicles, that use the Forest, just location of use.
- The designation of motorized routes does not translate to changes in emissions of vehicles that use the Forest, just location of where emission may occur.
- Fugitive dust emissions will be produced from motorized dispersed recreation within designated corridors and motorized areas. Acres associated with these activities will be included in this analysis
- Fugitive dust emissions will be produced from motorized big game retrieval over vegetated surfaces. Acres associated with this activity will be included in this analysis.
- The majority of dust generated from roads is a direct result of motorized traffic on the roads. Wind erosion plays a minor role.
- Road miles are converted to acres of disturbance (miles of road x assumed road widths) based on road maintenance levels. Table 7 displays the average road widths that were used:

Table 7: Assumed average road widths by maintenance level

Type of Route	Average Assumed Width of Route (ft.)
Single Track Trails	3
Maintenance Level 1 – Decommissioned*	0
Maintenance Level 1 – Closed	12
Maintenance Level 2	12
Maintenance Level 3	14
Maintenance Level 4	20
Maintenance Level 5	20
ATV Trails	8
Non Forest Service Roads	16

*Decommissioned is defined as returning the route to its natural (pre-road) condition.

Data Limitations: The amount of fugitive dust generated from acres of disturbed roadways on Forest has not been quantified, nor is there data that documents the frequency or timing of travel that occurs on these roadways. In addition, the Forest does not have data associated with traffic numbers, vehicle weights, speeds used by motorized traffic, tire types, and other factors that are required to calculate fugitive dust emissions. For this analysis, the Forest did not have the time, funding, or necessity to

obtain this data within practical reason. Estimates of increases or decreases in potential air impacts created by fugitive dust generation are relative to corresponding increases and decreases in acres of open roadways by alternative.

Issue Statements

1. The proposed motorized routes, specifically the type, extent, level of use and location of motorized routes, may lead to resource, recreation, social and economic impacts.

2. Motorized dispersed recreation within proposed designated corridors may lead to resource, recreation, social and economic impacts.

3. The proposed motorized big game retrieval may lead to resource, recreation, social and economic impacts.

4. The proposed motorized areas, specifically for OHV activities may lead to resource, recreation, social and economic impacts.

Relative Risk Analysis

This report uses a relative risk analysis to compare alternatives. Relative risk is considered the potential impact that can result from one action (alternative) measured against the potential impact that might result from a different action (alternative).

The following method was used for all direct and indirect effects analyses in this report, based on the premise that: A - The effects of a motorized route system, motorized dispersed recreation, motorized big game retrieval, and motorized areas on a key resource are considered the same under all alternatives; and B – More or less of these effects occur, or have the potential to occur, under each alternative, based on each alternative's design.

1) The direct/indirect effects* to the resource are described

2) Measures of the indicator for the resource area are used to compare each action alternative to the No Action Alternative.

3) These results of these measures are compared to determine relative risk

4) Results are summarized the resource area

*direct/indirect effects –Direct effects are those occurring at the same time and place as the triggering action. Indirect effects are those caused by the action, but that occur at a later time, or at a distance from the triggering action.

Indicators

Indicators for air quality were selected that represent how a motorized route system has the potential to impact this resource. These indicators include the following: 1) Motorized disturbance with potential to contribute to fugitive dust and visibility impairment across the Forest and in airsheds, and 2) Motorized disturbance with potential to contribute to fugitive dust and add to visibility impairment in Gila Wilderness Class I airshed and Aldo Leopold Wilderness and Blue Range Wilderness Class II airsheds

Air Quality

Indicator:

- Motorized disturbance with potential to contribute to fugitive dust and visibility impairment across the Forest and in airsheds.

Measure:

- Acres of motorized route disturbance Forestwide and per airshed
- Acres of potential disturbance from motorized big game retrieval, motorized dispersed recreation, and motorized areas Forestwide and per airshed

Indicator:

- Motorized disturbance with potential to contribute to fugitive dust and add to visibility impairment in Gila Wilderness Class I airshed and Aldo Leopold Wilderness and Blue Range Wilderness Class II airsheds

Measure:

- Acres of motorized route disturbance within 1 mile of Gila Wilderness Class I airshed and 1 mile of Aldo Leopold Wilderness and Blue Range Wilderness Class II airsheds
- Acres of potential disturbance from motorized big game retrieval, motorized dispersed recreation, and motorized areas within 1 mile of Gila Wilderness Class I airshed and 1 mile of Aldo Leopold Wilderness and Blue Range Wilderness Class II airsheds

Effects

The following effects discussion describes general direct and indirect effects that currently, or would, occur under all alternatives, including Alternative B – No Action. No ground disturbing activities such as decommissioning are proposed in this project.

Effects that will carry out throughout all alternatives are related to fugitive dust, vehicle emissions, air quality within the Gila Wilderness Class I airshed and other Wilderness areas, and potential impacts to climate change. The implementation of any of the action alternatives will impact air quality to some degree, with the potential for negative impacts varying by the number of roads that will remain open for motorized use in each proposal.

Fugitive dust levels produced from Forest roads result from routine forest management, user activities, and wind disturbance on native road surfaces. While wind disturbance can release fugitive dust from the road even without motorized interaction, the primary release of fugitive dust into the atmosphere is a result of wheels interacting with the native road surface and releasing dust particles into the air.

The main effects from fugitive dust as a result of vehicular use of motorized routes are reduced visibility on and adjacent to roads and increased levels of small diameter particulates (specifically $PM_{2.5}$ and PM_{10}) which can impact human health. Fugitive dust impacts depend on the quantity and drift potential of the dust particles that enter the air column. Large particles will typically settle out near the source. However, fine particles of dust may disperse over a much wider area, in particular on a windy day. These fine particles may float for a long time due to lack of gravitational settling. Drift distances for fugitive dust have been estimated based on particle size and wind speeds. These estimates indicate that for a typical mean wind speed of 10 mph, particles larger than about 100 microns in aerodynamic diameter are likely to settle out within 20 to 30 feet from the edge of the route. Particles that are 30 to 100 microns in

diameter are likely to settle further out, but usually within a few hundred feet of the source, depending on wind turbulence. Smaller particles such as PM2.5 and PM10 have much slower settling rates and are much more likely to be impacted by atmospheric turbulence. The release of these smaller particles becomes an indirect effect to air quality over a more widespread area. However, PM2.5 and PM10 levels would rapidly disperse over this larger area as they are carried by winds.

Exposure to particulate matter can aggravate a number of respiratory illnesses and may even cause early death in people with existing heart and lung disease. Both long-term and short-term exposure can have adverse health impacts. These finer particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health. Fugitive dust impacts, however, are highly localized and short-lived, thus minimizing health risks to the majority of Forest users.

Fugitive dust can have negative effects on vegetation, though mainly at high dust loadings. Its primary impact is on the plant's physiological processes, in particular photosynthesis. Heavy dust loadings can reduce light penetration into the plant, which in turn impacts its growth rate and vigor potential.

Emissions within the Forest boundary from automobile use would be most concentrated adjacent to motorized roads and trails. The direct effects of these emissions are formation of PM2.5, carbon monoxide, volatile organic compounds, nitrogen oxide, and production of diesel engine particulate matter. Indirect effects of vehicle emissions are related to air quality degradation as a result of PM2.5 and PM10, reduced ability of the blood to carry oxygen based on exposure to carbon monoxide, and formation of ozone in the atmosphere when hydrocarbons and nitrogen oxide precursor emissions react in the presence of sunlight. Ozone is a strong irritant that can constrict the airways, forcing the respiratory system to work harder to provide oxygen to the rest of the body.

Low numbers of vehicle traffic and good wind dispersion across the Forest are generally sufficient to avoid long-lasting air quality impacts. In addition, automobile emissions are controlled by standards that are designed to regulate outputs that contribute to the formulation of ozone and carbon monoxide. Emissions from OHVs, especially those with two-stroke engines, would have the most negative impact on air quality, as these can produce significant amounts of air borne contaminants. These contaminants can settle onto plants or into soils and act as fertilizers. If these volumes of emissions are significant, the contaminants can cause changes in plant community composition and alter growth rates. Some contaminants can persist in soils for several years.

Air quality within the Gila Wilderness Class I airshed and the Aldo Leopold and Blue Range Class II airsheds can be negatively impacted by motorized uses on adjacent native surface roads as this activity can reduce visibility by the production of dust. Fine particulate matter produced from Forest roads that becomes suspended in the air can act as light scatterers and contribute to regional haze. Currently, visibility in the the Gila Wilderness Class I airshed is regulated against impairment due to regional haze.

Impacts to climate change may occur from the burning of fossil fuels by motorized vehicles. This burning results in the emission of greenhouse gases including CO2, methane (CH4), nitrous oxide (N2O), and hydrofluorocarbons (HFCs). These gases are emitted as CO2, CH4, N2O emissions resulting directly from operation of the vehicle, and CO2 emissions resulting from operating the air conditioning system.

Alternative B – No Action

Impacts to air quality as a result of the current motorized route system on the Forest are detailed above in the Effects Common to All Alternatives. Under Forest Service jurisdiction, there are currently 4,614 miles of open routes that create 6,918 acres of roaded disturbance, with the majority being in the Lower Colorado River airshed. These routes are of varying widths based on maintenance levels. There are

currently 407 roaded acres found within one mile of all Wilderness areas on the Forest. Cross country travel by motor vehicles is permitted in all areas, except designated Wilderness, roads, trails, or areas specified in Forest Orders, and restricted off-road vehicle areas identified in the Forest Land Management Plan. This cross country travel includes access for motorized big game retrieval, dispersed recreation and camping areas. Currently, cross country travel associated with motorized big game retrieval, motorized dispersed recreation, and camping areas is not repetitious enough in the same location to generate notable amounts of fugitive dust. This would only occur in an area where an unauthorized route has been created, the route was frequently traveled, and little to no vegetation remained on the route.

Effects Unique to each Action Alternative based on Measure of the Indicator

Each action alternative will be evaluated based on the potential risk to air quality relative to the change from the No Action alternative. The effects common to all alternatives will have the potential to either increase, decrease or remain the same, based on the change from the No Action Alternative. The relative risk of change from baseline is derived based on the potential acres of disturbance that are possible under each of the action alternatives. Appendix A provides a complete set of tables displaying percent increase/decrease in acres of disturbance that have the potential to impact air quality from a motorized route system, motorized dispersed recreation and motorized areas, and motorized big game retrieval. (Note: Acres of motorized dispersed recreation and motorized areas were combined in this analysis).

Alternative C

Motorized Routes – Effects to air quality under this alternative would be similar to the No Action Alternative. Proposed open routes under Forest Service jurisdiction total 4,675 miles of open routes that create 6,899 acres of roaded disturbance. This represents <1% reduction Forestwide from the No Action, which is negligible in terms of change. Alternative C, by airshed shows a 1% increase in acres of potential disturbance in the Lower Colorado River airshed, approximately a 16% reduction in acres in the Lower Rio Grande airshed, approximately a 2% increase in acres in the Southwestern Closed airshed, and approximately a 1% reduction in acres in the Western Closed airshed. By Wilderness areas, Alternative C shows a 2% decrease in acres of potential disturbance within one mile of the Gila and Aldo Leopold Wilderness areas and a 16% increase in acres adjacent to the Blue Range Wilderness.

Motorized Dispersed Recreation (300' corridor designated along specific routes)—minimal effects to air quality are expected under this activity. Motorized dispersed recreation typically occurs over vegetated surfaces where little fugitive dust is generated. However, there would be more potential for fugitive dust to occur in areas where motorized dispersed recreation is allowed, than where it is prohibited. This activity is not expected to be repetitious enough in the same location to mobilize significant amounts of fine particles. Under all alternatives, there is greater than a 90% reduction in acres open to this activity, both Forestwide, by airshed, and adjacent to Wilderness areas.

Motorized Big Game Retrieval (1 mile corridor for elk, deer, bear, mountain lion, javelina, pronghorn)—minimal effects, similar to the No Action Alternative, would result under this activity. Motorized big game retrieval typically occurs over vegetated surfaces where little fugitive dust is generated. This activity would not be repetitious enough in the same location to mobilize significant amounts of fine particles. However, there would be more potential for fugitive dust to occur in areas where motorized big game retrieval is allowed, than where it is prohibited. Alternative C provides the most acres open to this activity.

Motorized Areas (37 areas: 1 motorcycle/ATV; 36 camping)—The Travel Management Rule defines 'areas' as open to all motorized vehicle use. The 36 camping areas proposed in this alternative are

existing sites with traditional use related to camping. The majority of these sites are less than 1 acre in size, totaling 24 acres in all. Limited ATV activity has occurred on these sites in the past, and it is anticipated that activity will continue to be limited. Minimal effects to air quality would result as a continuation of this traditional use. However, there would be more potential for fugitive dust to occur in motorized areas, than where this activity is prohibited. The single motorcycle/ATV area proposed is located near the Village of Reserve, within the Lower Colorado River airshed. This area covers approximately 3 acres and is located within an old borrow pit near the previous landfill site. Currently, there is little to no herbaceous vegetation at this area and the site would continue to remain denuded of most vegetation under this proposal. There would be recurrent mobilization of fugitive dust within these three acres during periods of use. This area would be a localized and short-lived source of negative impacts to air quality. This motorized area has the highest potential of generating fugitive dust of all areas proposed.

Alternative D

Motorized Routes—Effects to air quality under this alternative would be similar to Alternative B, with the possibility of a reduction in negative impacts from fugitive dust due to fewer miles of routes and acres of roaded disturbance available for motorized vehicle use.

Proposed open routes under Forest Service jurisdiction total 3,473 miles of open routes that create 5,240 acres of roaded disturbance. This represents a 24% reduction from the No Action. Alternative D, by airshed shows a 23% reduction in acres of potential disturbance in the Lower Colorado River airshed acres, approximately 34% reduction in acres in the Lower Rio Grande airshed, approximately 25% reduction in acres in the Southwestern Closed airshed, and approximately a 29% reduction in acres in the Western Closed airshed. By Wilderness areas, Alternative D shows a 19% decrease in acres of potential disturbance within one mile of the Gila Wilderness, a 24% decrease in acres adjacent to the Aldo Leopold Wilderness, and 16% increase in acres adjacent to the Blue Range Wilderness.

Motorized Dispersed Recreation (300' corridor designated along specific routes) — minimal effects similar to Alternative C, with less acres available for potential disturbance than Alternative C.

Motorized Big Game Retrieval (within 300' motorized dispersed recreation corridor) — minimal effects similar to Alternative C, with less acres available for potential disturbance than Alternative C.

Motorized Areas (no areas designated)—There would be no negative impacts to air quality due to camping areas. This alternative is an improvement over Alternatives C, F, and G because there is no proposed three-acre motorcycle/ATV area that would contribute to recurring, localized fugitive dust emissions near the Village of Reserve.

Alternative E

Motorized Routes—Effects to air quality under this alternative would be similar to Alternative B, with the possibility of a reduction in negative impacts from fugitive dust due to fewer miles of routes and acres of roaded disturbance available for motorized vehicle use. Proposed open routes under Forest Service jurisdiction total 2,755 miles of open routes that create 2,699 acres of roaded disturbance. This represents a 39% reduction from the No Action, which represents the largest reduction in open routes of all alternatives. Alternative E, by airshed shows 39% reduction in acres of potential disturbance in the Lower Colorado River airshed acres, approximately 38% reduction in acres in the Lower Rio Grande airshed, approximately 39% reduction in acres in the Southwestern Closed airshed, and approximately a 42% reduction in acres in the Western Closed airshed. By Wilderness areas, Alternative E shows a 30% decrease in acres of potential disturbance within one mile of the Gila Wilderness, a 33% decrease in acres

adjacent to the Aldo Leopold Wilderness, and 3% decrease in acres adjacent to the Blue Range Wilderness.

Motorized Dispersed Recreation (No motorized dispersed recreation corridors designated)—No negative impacts to air quality due to motorized dispersed recreation.

Motorized Big Game Retrieval (No MBGR permitted)—No negative impacts to air quality due to motorized big game retrieval.

Motorized Areas (no areas designated) – Same as Alternative D—no negative impacts to air quality due to areas.

Alternative F

Motorized Routes—Effects to air quality under this alternative would be similar to Alternative B, with the possibility of a reduction in negative impacts from fugitive dust due to fewer miles of routes and acres of roaded disturbance available for motorized vehicle use. Proposed open routes under Forest Service jurisdiction total 3,860 miles of open routes that create 5,789 acres of roaded disturbance. This represents a 16% reduction from the No Action. Alternative F, by airshed shows a 15% reduction in acres of potential disturbance in the Lower Colorado River airshed acres, approximately 23% reduction in acres in the Lower Rio Grande airshed, approximately 16% reduction in acres in the Southwestern Closed airshed, and approximately a 22% reduction in the Western Closed airshed. By Wilderness areas, Alternative E shows a 12% decrease in acres of potential disturbance within one mile of the Gila Wilderness, a 10% decrease in acres adjacent to the Aldo Leopold Wilderness, and 13% increase in acres adjacent to the Blue Range Wilderness.

Motorized Dispersed Recreation (300' corridor designated along specific routes) —minimal effects similar to Alternative C, with less acres available for potential disturbance than Alternative C, but more acres than Alternative D.

Motorized Big Game Retrieval (within ½ mile of motorized routes, elk only)—minimal effects similar to Alternative C, with less acres available for potential disturbance than Alternative C, but more than Alternatives D and G..

Motorized Areas (37 areas: 1 motorcycle/ATV; 36 camping)—same as Alternative C

Alternative G

Motorized Routes—Effects to air quality under this alternative would be similar to Alternative B, with the possibility of a reduction in negative impacts from fugitive dust due to fewer miles of routes and acres of roaded disturbance available for motorized vehicle use. Proposed open routes under Forest Service jurisdiction total 3,829 miles of open routes that create 5,746 acres of roaded disturbance. This represents a 17% reduction from the No Action, which is virtually the same as Alternative F. Alternative G, by airshed shows a 16% reduction in acres of potential disturbance in the Lower Colorado River airshed acres, approximately 23% reduction in acres in the Lower Rio Grande airshed, approximately 16% reduction in acres in the Southwestern Closed airshed, and approximately a 23% reduction in the Western Closed airshed. By Wilderness areas, Alternative E shows a 12% decrease in acres of potential disturbance within one mile of the Gila Wilderness, a 10% decrease in acres adjacent to the Aldo Leopold Wilderness, and 16% increase in acres adjacent to the Blue Range Wilderness.

Motorized Dispersed Recreation (300' corridor designated along specific routes) — minimal effects similar to Alternatives C, D and F.

Motorized Big Game Retrieval (within 300' motorized dispersed recreation corridor) — same as Alternative D

Motorized Areas (37 areas: 1 motorcycle/ATV; 36 camping)—same as Alternative C

Tables 8-13 provide a summary of potential acres associated with motorized routes and areas that would be available for vehicular traffic to produce fugitive dust, both Forestwide and adjacent to the Gila Wilderness Class I airshed. Appendix A contains a complete set of tables by airshed and adjacent to all wilderness areas found on the Gila National Forest.

Summary of Effects

Each of the alternatives were analyzed to determine if there is potential for motorized route systems, including motorized dispersed recreation corridors, motorized areas, and motorized big game retrieval, on the Gila National Forest to degrade air quality, contribute to violations of National Ambient Air Quality Standards, contribute to visibility impairment, or to affect the Gila Wilderness Class I airshed and the Aldo Leopold and Blue Range Wilderness Class II airsheds beyond their current condition. The direct effects to air quality by motorized route systems (including motorized dispersed recreation corridors, motorized areas, and motorized big game retrieval) result from the relationship of motorized uses that that occur on native surface routes. While this project does not propose a change in the levels of use, it will result in a change in the locations of use and acres available for use that may impact air quality.

Under Alternatives D, E, F, and G, fewer miles of roads and trails are open for motorized use, and fewer acres are available for motorized dispersed recreation, motorized areas, and motorized big game retrieval, as compared to Alternative B (No Action). Alternative C is similar to Alternative B, with an increase in single track miles (motorcycle), but a slight decrease in overall acres (due to a decrease in Level 2 route miles and associated acres). Alternative B – No Action would not produce fugitive dust beyond the amount produced currently by routine forest management or user activities. The effects of Alternatives C, D, E, F, and G would be similar to Alternative B, except that impacts from fugitive dust and vehicle emissions may be reduced because fewer miles and/or acres of roaded disturbance would be available for motorized vehicle use. It is possible that the same amount of motorized use would occur across the Forest, with users increasing their activities on the remaining open routes, corridors and areas, if other routes and areas of the Forest are made unavailable (closed). Closed roads would continue to be a minor source of fugitive dust during wind events until the road has been decommissioned, or has returned to pre-road conditions naturally.

Analysis indicates that, Forestwide, Alternative E provides the greatest reduction in potential roaded acres that may impact air quality and reduce visibility within or adjacent to Wilderness airsheds, followed by Alternative D. Alternatives F and G reduce motorized route acres by virtually the same amount. Alternative C provides the least reduction in motorized route acres, and would leave the most motorized routes and areas available for potential disturbance that could impact air quality.

Potential acres of disturbance related to motorized dispersed recreation and motorized areas that could contribute to fugitive dust and add to visibility impairment in, or adjacent to, Wilderness areas are similar under Alternatives C, D, F and G. Each of these alternatives eliminates uncontrolled motorized cross-country travel and limits this type of activity to designated corridors and areas. Alternative E eliminates uncontrolled motorized cross country travel as well as does not designate any corridors or areas. This, in effect, restricts motorized cross country travel from the majority of the Forest, thus reducing potential acres of disturbance by greater than 90% in all of the action alternatives.

Potential acres of disturbance related to motorized big game retrieval that could contribute to fugitive dust and add to visibility impairment in, or adjacent to, Wilderness areas are similar under Alternatives D and G. Alternative E eliminates it motorized big game retrieval entirely. In these three alternatives, there is a reduction in potential acres of disturbance of greater than 90% from Alternative B-No Action. Reductions in potential acres of disturbance that may impact air quality also occur in Alternatives F and C, however to a lesser degree than D, E and G. Each of the action alternatives eliminates uncontrolled motorized big game retrieval. In Alternatives C, D, F, G this type of activity is limited to designated corridors of varying widths.

Visibility Impairment of Wilderness Areas:

Under all action alternatives, Alternative E provides the least amount of acres available for potential disturbance by motorized routes, motorized dispersed recreation, motorized areas, and motorized big game retrieval that have the potential to contribute to visibility impairment within the Gila Wilderness Class I airshed, and the Aldo Leopold and Blue Range Wilderness areas. Appendix A provides tables that display percent increase/decrease in acres of motorized activities within one mile of all wilderness areas on the Gila National Forest. It is not expected that selection of any of the action alternatives would degrade air quality from its current state, or have a long-term, noticeable or measurable impact on visibility.

In general, air quality on the Gila National Forest is good, given current motorized activities. With reductions across the Forest in acres (related to motorized routes and motorized cross county travel) that have the potential to contribute to fugitive dust and add to visibility impairment, it is expected that air quality would continue to remain good under all of the action alternatives.

Table 8: Forestwide—Potential air quality impacts by alternative

Motorized Miles/Acres with potential to contribute to fugitive dust and add to visibility impairment Forestwide	Miles	Change in Miles from No Action	% Increase or Decrease in Miles from No Action	Acres	Change in Acres from No Action
Alternative B – No Action	4,614			6,918	
Alternative C	4,675	61*	1%	6,899	-19*
Alternative D	3,473	-1,141	-25%	5,240	-1,678
Alternative E	2,755	-1,859	-40%	4,219	-2,699
Alternative F	3,860	-754	-16%	5,789	-1,129

*Note: although Miles increase in Alternative C, there is a decrease in acres. This is attributed to an increase in single track (motorcycle) miles that were assumed to have a 3 foot width, and a decrease in Level 2 route miles with an assumed width of 12 feet (see page 21).

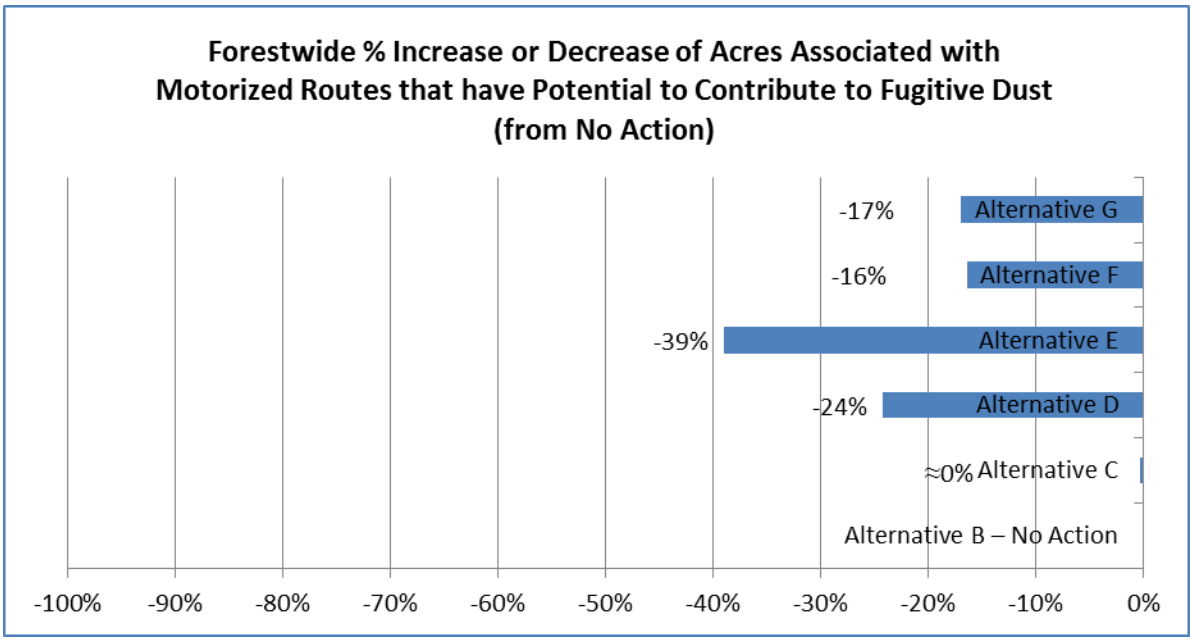

Figure 11: Forestwide percentage increase or decrease of acres associated with motorized routes that have potential to contribute to fugitive dust (from no action)

Table 9. Miles/acres of motorized routes within 1 mile of Gila Wilderness Class I Airshed

Motorized Miles/Acres within 1 mile of Gila Wilderness -- potential to contribute to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	162			250		
Alternative C	159	-3	-2%	245	-5	-2%
Alternative D	130	-32	-20%	203	-47	-19%
Alternative E	110	-52	-32%	175	-75	-30%
Alternative F	143	-19	-12%	221	-29	-12%
Alternative G	142	-20	-12%	221	-29	-12%

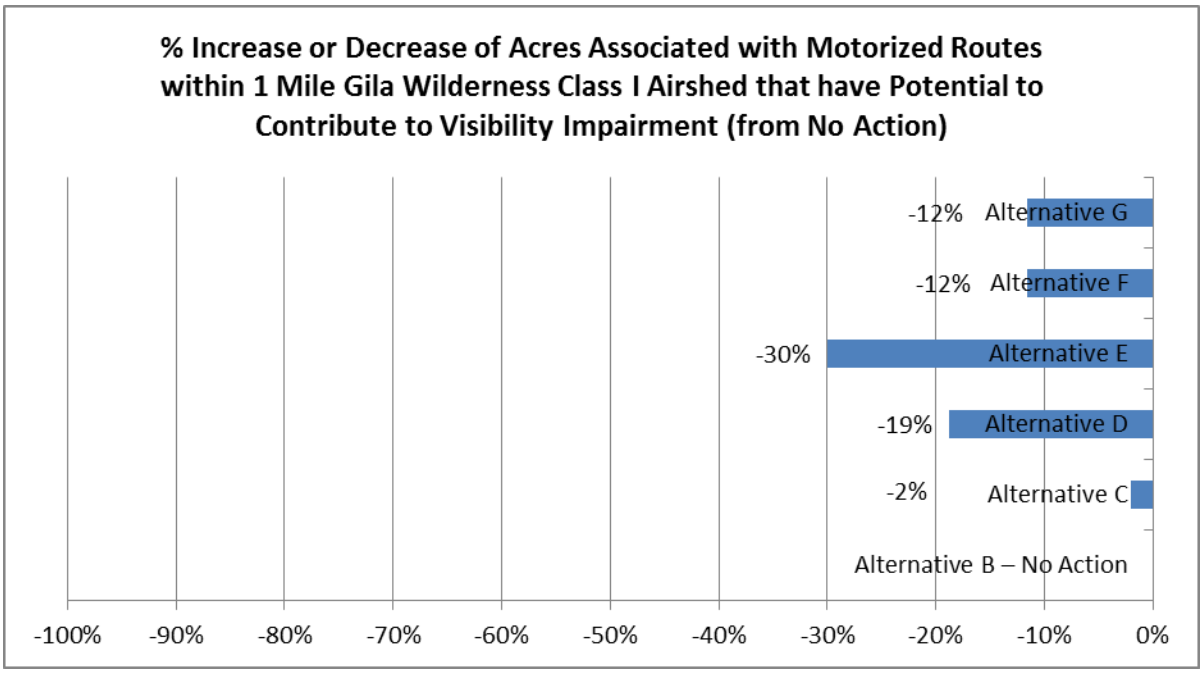

Figure 12: Percentage increase or decrease of acres associated with motorized routes within 1 mile of Gila Wilderness Class 1 Airshed that have potential to contribute to visibility impairment (from no action)

Table 10: Motorized dispersed recreation and area acres forestwide

Motorized dispersed recreation and Area Acres with Potential to Contribute to Fugitive Dust	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	2,443,368		
Alternative C	108,207	-2,335,161	-96%
Alternative D	84,388	-2,358,980	-97%
Alternative E	0	-2,443,368	-100%
Alternative F	101,942	-2,341,426	-96%
Alternative G	94,035	-2,349,333	-96%

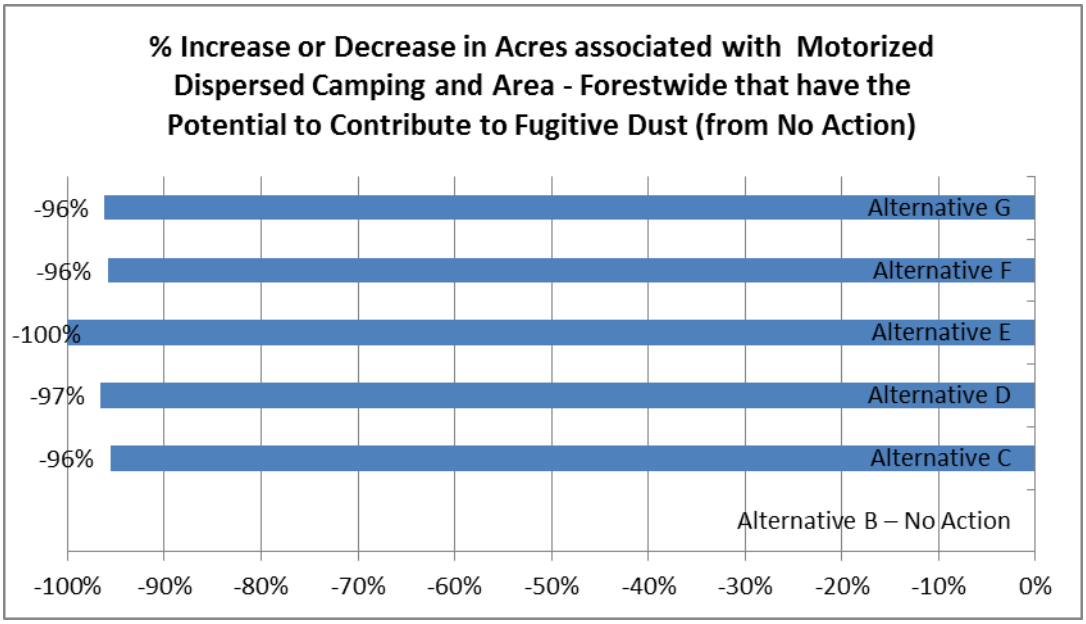

Figure 13: Percentage increase or decrease in acres associated with motorized dispersed camping and area – forestwide that have the potential to contribute to fugitive dust (from no action)

Table 11: Motorized dispersed recreation and area acres within 1 mile of Gila Wilderness (Class I)

Within 1 Mile Gila Wilderness - Motorized dispersed recreation and Area Acres with Potential to Contribute to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	97,520		
Alternative C	4,887	-92,633	-95%
Alternative D	4,423	-93,097	-95%
Alternative E	0	-97,520	-100%
Alternative F	919	-96,601	-99%
Alternative G	4,671	-92,849	-95%

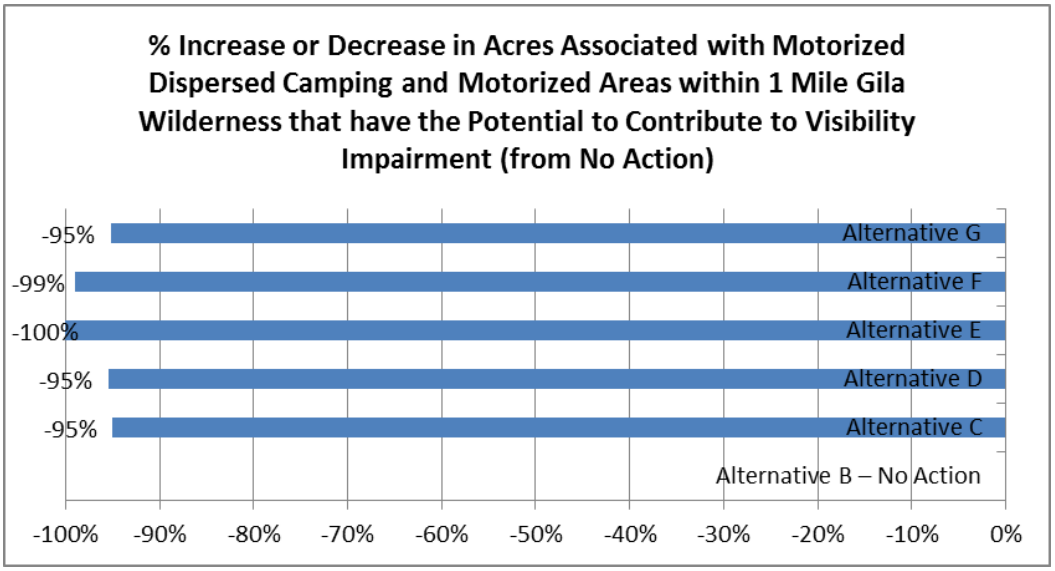

Figure 14: Percentage increase or decrease in acres associated with motorized dispersed camping and motorized areas within 1 mile of Gila Wilderness that have the potential to contribute to visibility impairment (from no action)

Table 12: Forestwide motorized big game retrieval acres

Forestwide - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	2,443,368		
Alternative C	2,078,660	-364,708	-15%
Alternative D	84,388	-2,358,980	-97%
Alternative E	0	-2,443,368	-100%
Alternative F	1,506,574	-936,794	-38%
Alternative G	94,008	-2,349,360	-96%

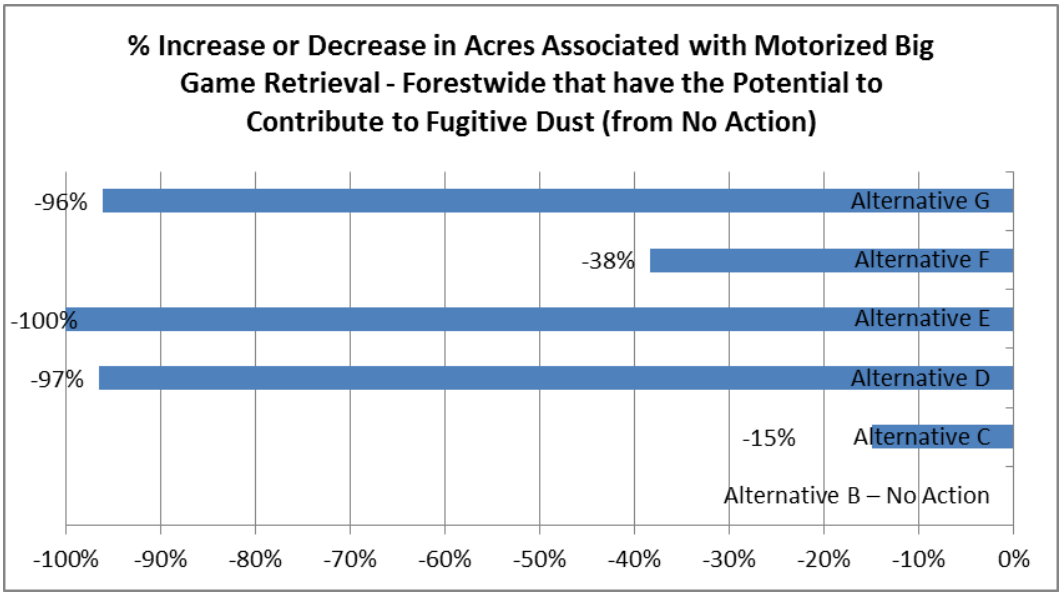

Figure 15: Percentage increase or decrease in acres associated with motorized big game retrieval – forestwide that have the potential to contribute to fugitive dust (from no action)

Table 13: Motorized big game retrieval within 1 mile of Gila Wilderness (Class I)

Within 1 Mile Gila Wilderness - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	97,520		
Alternative C	83,320	-14,200	-15%
Alternative D	4,423	-93,097	-95%
Alternative E	0	-97,520	-100%
Alternative F	63,021	-34,499	-35%
Alternative G	4,667	-92,853	-95%

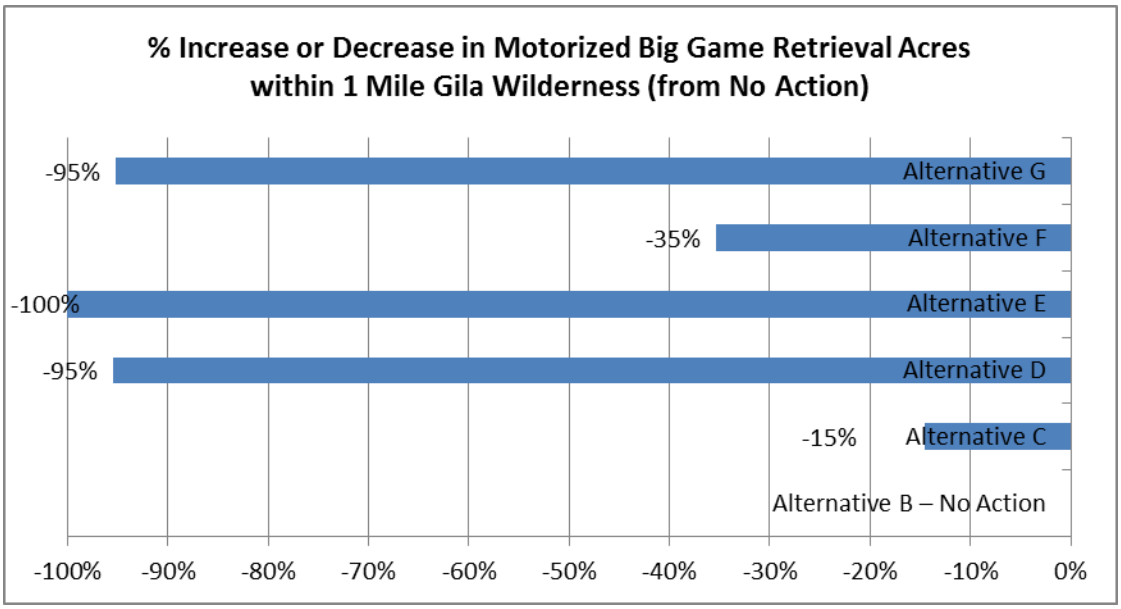

Figure 16: Percentage increase or decrease in motorized big game retrieval acres within 1 mile of Gila Wilderness (from no action)

Cumulative Effects

Cumulative effects were considered at the airshed level. In all action alternatives, Alternative E indicates the largest decrease in acres related to motorized routes, motorized dispersed recreation and areas, and motorized big game retrieval in all four airsheds. Alternatives D, F, and G also show reductions in acres available for motorized activities across each airshed at varying levels. Alternative C shows reductions in acres related to motorized dispersed recreation, motorized areas, and motorized big game retrieval, and a decrease in acres of motorized route acres in the Lower Rio Grande airshed and the Western Closed airshed (slight, -1%). There are slight increases (1%-2%) in motorized route acres in the Lower Colorado River airshed and the Southwestern Closed airshed for Alternative C. This project does not propose to change use levels, just the location of where the use may occur.

At the airshed level, under all alternatives, the cumulative impacts of fugitive dust on air quality caused by the proposed change in motorized travel on designated routes and cross country travel, combined with all other activities, would likely be immeasurable. Some past actions may no longer be having any effect on air quality. The actions contributing to cumulative effects include those industrial activities listed

earlier in Table 3 as well as other activities occurring on Forest lands such as prescribed fire, wildland fire, motorized traffic, and harvest operations, because they have caused or have the potential to cause changes in air quality. Fine particulate matter from road dust would combine with other particulates produced during implementation of Forest projects such as prescribed burning and harvest operations. Implementation of projects off-Forest (i.e. state, private, BLM lands) such as prescribed burns, harvest and mining operations, and travel on native surface roads would also contribute particles.

There is no data to support predictions of the amount of particulates contributed by all of these other sources. In addition, past impacts to air quality are not usually evident. Motorized travel emissions would only be combined with other localized sources. Due to low traffic volume, these emissions are fairly low across the Gila National Forest and disperse rather quickly. Actual cumulative effects would be relatively minor and should show little change in any alternative from existing condition. Depending on timing with other projects, some combinations of fugitive dust from motorized routes and other particulates in the air could contribute to further reduce visibility for short time periods within the Gila Wilderness Class I airshed. Emissions produced by motorized vehicles in use across the Forest would continue to contribute to greenhouse gases, as under current conditions.

Irreversible and/or Irretrievable Commitment of Resource

There would be no irreversible or irretrievable impacts to air resources with implementation of any of the action alternatives. Air quality would remain comparable to existing conditions.

Conclusions about Alternative Effects

In summary, Alternative E, unilaterally, indicates largest decrease in potential direct, indirect and cumulative effects to air quality from Alternative B-No Action. Alternative D has second largest decrease in potential effects to air quality across the board. Alternatives F & G follow Alternative D and are mostly similar (within 1%), while Alternative C indicates the least amount of decrease in potential effects to air quality from Alternative B-No Action. This alternative poses little change from Alternative B - No Action.

The Gila National Forest is currently meeting New Mexico Air Quality Standards and meeting Forest Plan standards and guidelines under the No Action Alternative, and would continue to meet all laws, regulations, and policies with implementation of any of the action alternatives.

Air quality is currently good in the area of the Gila National Forest, as evidenced by available data and information provided by the NMED Air Quality Bureau. The Gila National Forest has continued to follow state regulations and Forest Plan guidance to ensure that its actions are in compliance. It is, however, difficult to distinguish between the alternatives other than via a relative risk analysis as there is no available monitoring data linked to fugitive dust, motorized routes, and/or motorized uses. However, as there are no alternatives that propose to increase the acres of motorized routes on the Forest (minor increase of miles in Alternative C), it is the conclusion of this analysis that any alternative selected will continue to keep the Forest's efforts for air quality improvement on the right path.

Effects of Forest Plan Amendments

Amendments 1 thru 6 to the forest plan may have effects because they propose changes in the management of specific areas of the forest. These effects, like those from the proposed action and alternatives, are disclosed as part of the effects analysis above.

Amendment 7 is administrative in nature and not expected to have effects as a result of this project or future projects. This proposed amendment, for the most part, simply updates and provides consistent direction for application of the Forest Plan with the Travel Management.

Best Available Science

This evaluation was developed in consideration of the best available science and is consistent with the Gila National Forest Land and Resource Management Plan, as amended. It includes use of current (web-posted) data and reports available from various state and federal government agencies including: New Mexico Environment Department; U.S. Environmental Protection Agency; Forest Service directives (manuals and handbooks); current and past inventory, monitoring, and administrative information; and use of current literature endorsed by the Southwestern Region Forest Service. A list of references is available, with websites as available.

References Cited

Adams, H.D., M. Guardiola-Claramonte, G.A. Barron-Gafford, J.C. Villegas, D.D. Breshears, C.B. Zou, P.A. Troch, and T.E. Huxman. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global-change-type drought. Proceedings of the National Academy of Sciences, 106:7063

Allen, C.D., A.K. Macalady, H. Chenchouni, D. Bachelet, N. McDowell, M. Vennetier, T. Kitzberger, A. Rigling, D.D. Breshears, E.H. Hogg, P. Gonzalez, R. Fensham, Z. Zhang, J. Castro, N. Demidova, J.-H. Lim, G. Allard, S.W. Running, A. Semerci, and N. Cobb. 2010. A global overview of drought and heat-induced tree mortality reveals emerging climate change risks for forests. Forest Ecology and Management, 259:660-684 doi: 10.1016/j.foreco.2009.09.001, [Available online at http://www.sciencedirect.com/science/article/pii/S037811270900615X]

Angold, P.G. 1997. The impact of a road upon adjacent heathland vegetation: effects on plant species composition. Journal of Applied Ecology, 34(2):409–417.

Bazzaz, F.A. and K. Garbutt. 1988. The Response of annuals in competitive neighborhoods: Effects of elevated CO2. Ecology, 69:937-946.

Blankenship, J. 1989. Issues and Concerns Regarding the Identification and Protection of Air Quality Related Values of the Gila Wilderness. Earth Resource Consultants. Tucson, Arizona. Prepared for the Gila National Forest. 48 pp.

Blankenship, J. 1990a. Air Quality Related Values, Sensitive Receptors, and Levels of Acceptable Change for the Gila Wilderness. Earth Resource Consultants. Tucson, Arizona. Prepared for the Gila National Forest.

Bowman, D.M.J.S., J.K. Balch, P. Artaxo, W.J. Bond, J.M. Carlson, M.A. Cochrane, C.M. D'Antonio, R.S. DeFries, J.C. Doyle, and S.P. Harrison. 2009. Fire in the Earth system. Science, 324:481-484.

CARB. 2007. California Air Resources Board; available at: http://www.arb.ca.gov/cc/cc.htm.

Daines, R.D., H. Motto and D.M. Chilko. 1970. Atmospheric lead: Its relationship to traffic volume and proximity to highways. Environmental Science and Technology, 4:318–322.

Dukes, J.S., J. Pontius, D. Orwig, J.R. Garnas, V.L. Rodgers, N. Brazee, B. Cooke, K.A. Theoharides, E.E. Stange, R. Harrington, J. Ehrenfeld, J. Gurevitch, M. Lerdau, K. Stinson, R. Wick, and M. Ayres. 2009. Responses of insect pests, pathogens, and invasive plant species to climate change in the forests of northeastern North America: What can we predict? Canadian Journal of Forest Research, 39:231-248

Environmental Protection Agency. 2013. http://www.epa.gov/cgi-bin/broker?polchoice=PM&_debug=0&_service=data&_program=dataprog.national_1.sas#pmloc . last viewed April 2013.

Environmental Protection Agency (EPA). 2003. http://www.epa.gov/ttn/chief/ap42/ . AP 42 Compilation of Air Pollutant Emission Factors. Volume I Stationary Point and Area Sources. Fifth Edition. Chapter 13 Miscellaneous Sources.

Environmental Protection Agency. 2010. National Ambient Air Quality Standards. http://www.epa.gov/air/criteria.html

Environmental Protection Agency, 2011a. US Environmental Protection Agency. Air Quality System Data Mart [internet database]. Web Site: http://www.epa.gov/ttn/airs/aqsdatamart (3/30/12).

Environmental Protection Agency, 2013. Air Emissions Sources. Where You Live. State and County Emission Summaries. Particulate Matter. State of New Mexico, Grant, Catron, Sierra and Hidalgo Counties. http://www.epa.gov/air/emissions/where.htm

Falkengren-Grerup, U. 1986. Soil acidification and vegetation changes in deciduous forest in southern Sweden. Oecologia, 70:339–347.

Ferris, R. and G. Taylor. 1995. Contrasting effects of elevated CO2 and water deficit on two native herbs. New Phytologist, 131:491-501.

FLAG. 2000. Federal Land Managers' Air Quality Related Values Workgroup. Phase I Report. December 2000, 186 pp.

FLAG. 2010. Federal Land Managers' Air Quality Related Values Workgroup. Phase I Report – Revised (October 2010). Natural Resource Report NPS/NRPC/NRR—2010/232.

Forman, R.T.T., D. Sperling, J.A. Bisonette, A.P. Clevenger, C.D. Cutshall, V.H. Dale, L. Fahrig, R. France, C.R. Goldman, K. Heanue, J. Jones, F.J. Swanson, T. Turrentine, and T.C. Winter. 2003. Road ecology: science and solutions. Island Press. 481 pp.

Foti, R., J. Ramírez, and B. Thomas. 2012. Vulnerability of U.S. water supply to shortage: a technical document supporting the Forest Service 2010 RPA Assessment. Fort Collins, CO: U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station.

Frisvold, G. B., L. E. Jackson, J. G. Pritchett, and J. P. Ritten. 2013. "Agriculture and Ranching." In Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 218–239. A report by the Southwest Climate Alliance. Washington, DC: Island Press.

Guido, Z. 2008. Southwest Climate Change Network. http://www.southwestclimatechange.org/impacts/land/fire

Hoadley, J. 2008. Air Quality Baseline Report: Aldo Leopold, Blue Range and Gila Wilderness Areas. Southwestern Region. Albuquerque. 12 pp.

Holzapfel C. and W. Schmidt. 1990. Roadside vegetation along transects in the Judean Desert. Israel Journal of Botany, 39:263-270.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. S. Solomon, D. Quin, M. Manning et al. Cambridge, United Kingdom, Cambridge University Press: 996pp.

Keane, R.E., J.K. Agee, P. Fule, J.E. Keeley, C. Key, S.G. Kitchen, R. Miller, and L.A. Schulte. 2009. Ecological effects of large fires on US landscapes: benefit or catastrophe? International Journal of Wildland Fire, 17:696-712.

Keeley, J.E. and P.H. Zedler. 2009. Large, high-intensity fire events in southern California shrublands: debunking the fine-grain age patch model. Ecological Applications, 19:69-94.

Littell, J.S., D. McKenzie, D.L. Peterson, and A.L. Westerling. 2009. Climate and wildfire area burned in western US ecoprovinces, 1916-2003. Ecological Applications, 19:1003-1021.

Lovich, J.E. and D. Bainbridge. 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration. Environ. Mgmt. 24:309-326.

McDowell, N., W.T. Pockman, C.D. Allen, D.D. Breshears, N. Cobb, T. Kolb, J. Plaut, J. Sperry, A. West, and D.G. Williams. 2008. Mechanisms of plant survival and mortality during drought: why do some plants survive while others succumb to drought? New Phytologist, 178:719-739.

Morton, D.C. and Global Institute of Sustainable Forestry. 2003. Assessing the environmental, social, and economic impacts of wildfire. Yale University, School of Forestry and Environmental Studies, Global Institute of Sustainable Forestry.

Motto, H.L., R.H. Daines, D. M. Chilko, and C. K. Motto. 1970. Lead in soils and plants; its relationship to traffic volume and proximity to highways. Environmental Science and Technology, 4:231–238.

National Acid Deposition website. http://nadp.sws.uiuc.edu/sites/siteinfo.asp?id=NM01&net=NTN

National Climate Assessment and Development Advisory Committee. 2013. "United States Global Change Research Program." Federal Advisory Committee Draft Climate Assessment Report Released for Public Review. N.p., n.d. Web. 27

Ouren, D.S., C. Haas, C.P. Melcher, S.C. Stewart, P.D. Ponds, N.R. Sexton, L. Burris, T. Fancher, and Z.H. Bowen. 2007. Environmental effects of off-highway vehicles on Bureau of Land Management lands: A literature synthesis, annotated bibliographies, extensive bibliographies, and internet resources: U.S. Geological Survey, Open-File Report 2007-1353, 225 p.

Painter, T.H., J.S. Deems, J. Belnap, A.F. Hamlet, C.C. Landry, and B. Udall. 2010. Response of Colorado River runoff to dust radiative forcing in snow. Proceedings of the National Academy of Sciences, October 5, 2010. 107(40):17125-17130.

Quarles, H.D., R. B. Hanawalt, and W. E. Odum. 1974. Lead in small mammals, plants, and soil at varying distances from a highway. Journal of Applied Ecology, 11(3):937–949.

Richardson, L.A., P.A. Champ, and J.B. Loomis. 2011. The hidden cost of wildfires: Economic valuation of health effects of wildfire smoke exposure in Southern California. Journal of Forest Economics, 18:14-35.

Seager, R., M. Ting, I. Held, Y. Kushnir, J. Lu, G. Vecchi, H. Huang, N. Hamik, A. Leetmaa, N. Lau, C. Lie, J. Velez, and N. Naik. (2007). "Model Projections of an Imminent Transition to a More Arid Climate in Southwestern North America." Science, 316(5828): 1181-1184.

State of New Mexico. n.d. New Mexico Administrative Code. http://www.nmcpr.state.nm.us/nmac/

State of New Mexico, Air Quality Bureau. 2003. Sulfur Dioxide Redesignation Request and Maintenance Plan for the Grant County, New Mexico Nonattainment Area. Santa Fe. 19 pp. (http://www.nmenv.state.nm.us/aqb/Control_Strat/sip/Grant_Text.pdf)

State of New Mexico. 2005. New Mexico Smoke Management Program Guidance Document, Appendix K. New Mexico Environment Department. Air Quality Bureau. Albuquerque, New Mexico.

State of New Mexico. 2013. Air Quality Bureau. http://www.nmenv.state.nm.us/aqb/. Last viewed April 2013.

USDA Forest Service. 1986. Gila National Forest Plan. Silver City. NM

USDA Forest Service. 1990. Forest Service Manual. 2500 Watershed and Air Management- Chapter 2580 Weather Program/

USDA Forest Service. 2005. Forest Service Manual. 2500 Watershed and Air Management- Chapter 2580 Weather Program. Region 3 Supplement.

USDA Forest Service Southwestern Region. 2010. Southwestern Region Climate Change – Trends and Forest Planning. May, 2010 46 pp.

Van Mantgem, P.J., N.L. Stephenson, J.C. Byrne, L.D. Daniels, J.F. Franklin, P.Z. Fulé, M.E. Harmon, A.J. Larson, J.M. Smith, and A.H. Taylor. 2009. Widespread increase of tree mortality rates in the western United States. Science, 323:521-524.

VIEWS - Visibility Information Exchange Web System. 2012. http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx (3/30/12).

Westerling, A.L., M.G. Turner, E.A.H. Smithwick, W.H. Romme, and M.G. Ryan. 2011. Continued warming could transform Greater Yellowstone fire regimes by mid-21st century. Proceedings of the National Academy of Sciences doi: 10.1073/pnas.1110199108, [Available online at http://www.pnas.org/content/early/2011/07/20/1110199108.abstract; http://www.pnas.org/content/108/32/13165.full.pdf]

WFLC-Western Forestry Leadership Coalition. 2010. The True Cost of Wildfire in the Western U.S., 15 pp. [Available online at http://www.wflccenter.org/news_pdf/324_pdf.pdf]

Wheeler, G.L. and G.L. Rolfe. 1979. The relationship between daily traffic volume and the distribution of lead in roadside soil and vegetation. Environmental Pollution, 18:265–274.

Williams, A.P., C.D. Allen, A.K. Macalady, D. Griffin, C.A. Woodhouse, D.M. Meko, T.W. Swetnam, S.A. Rauscher, R. Seager, and H.D. Grissino-Mayer. 2012. Temperature as a potent driver of regional forest drought stress and tree mortality. Nature Climate Change 3(3): 292-297

Williams, A.P., C.D. Allen, C.I. Millar, T.W. Swetnam, J. Michaelsen, C.J. Still, and S.W. Leavitt. 2010. Forest responses to increasing aridity and warmth in the southwestern United States. Proceedings of the National Academy of Sciences, 107: 21289-21294.

Winner, W.E. and C.J. Atkinson. 1986. Absorption of air pollutants by plants and consequences for growth. Trends in Ecology and Evolution, 1:15-18.

Prepared by

Carolyn Koury
Watershed and Air Program Manager/ Forest Hydrologist
December 2013

Appendix A. Tables and Graphs of Miles and Associated Acres of Disturbance

Motorized Miles/Acres by Airshed

Table A1. Forestwide—Potential Air Quality Impacts by Alternative

Forestwide Motorized Miles/Acres with potential to contribute to fugitive dust and add to visibility impairment Forestwide	Miles	Change in Miles from No Action	% Increase or Decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or Decrease in Acres from No Action
Alternative B – No Action	4,614			6,918		
Alternative C	4,675	61*	1%	6,899	-19*	≈0%
Alternative D	3,473	-1,141	-25%	5,240	-1,678	-24%
Alternative E	2,755	-1,859	-40%	4,219	-2,699	-39%
Alternative F	3,860	-754	-16%	5,789	-1,129	-16%
Alternative G	3,829	-785	-17%	5,746	-1,172	-17%

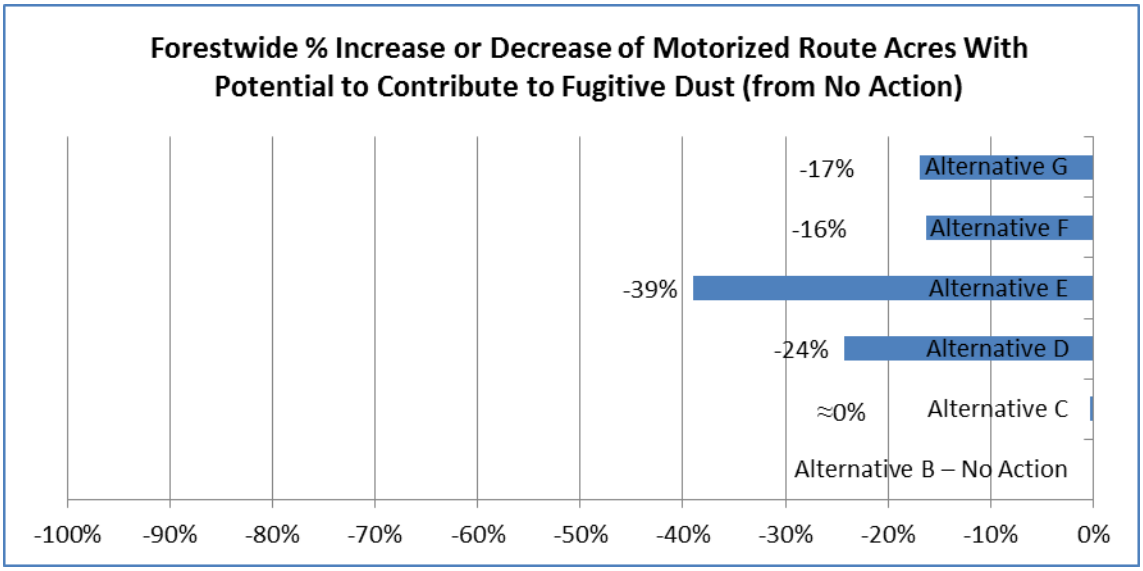

Figure A1. Forestwide percentage increase or decrease of motorized route acres with potential to contribute to fugitive dust (from no action)

Table A2. Lower Colorado River Airshed—potential air quality impacts by alternative

Lower Colorado River Motorized Miles/Acres with potential to contribute to fugitive dust and add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	3,784			5,686		
Alternative C	3,850	66	2%	5,720	34	1%
Alternative D	2,886	-898	-24%	4,362	-1,324	-23%
Alternative E	2,262	-1,522	-40%	3,478	-2,208	-39%
Alternative F	3,203	-581	-15%	4,811	-875	-15%
Alternative G	3,177	-607	-16%	4,774	-912	-16%

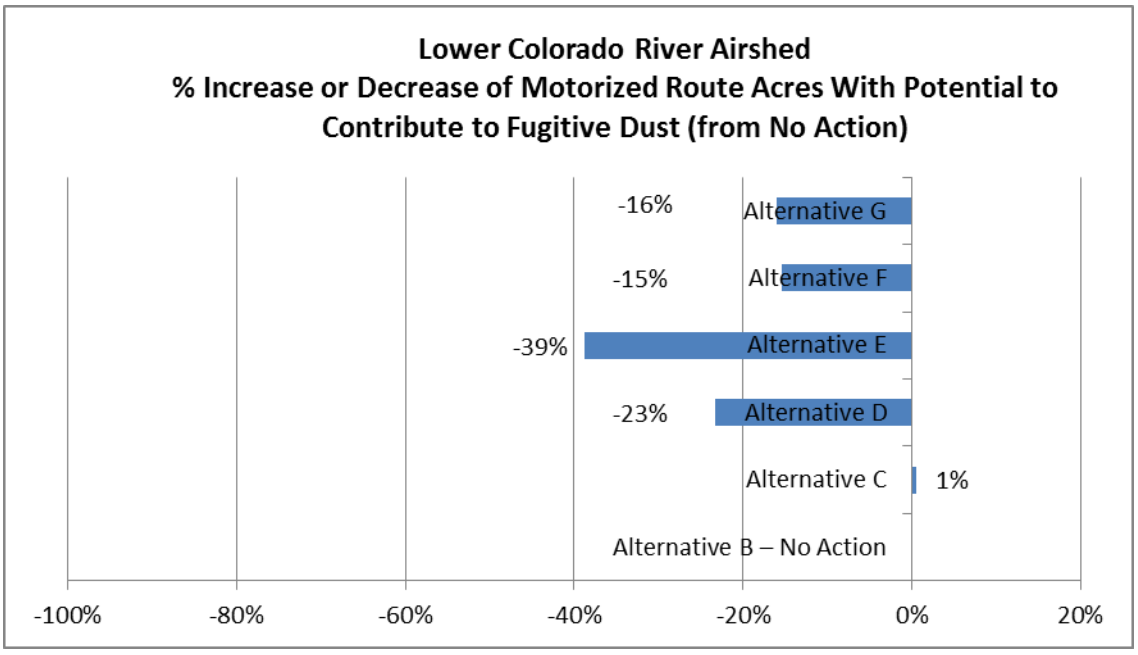

Figure A2. Lower Colorado River Airshed percentage increase or decrease of motorized rout acres with potential to contribute to fugitive dust (from no action)

Table A3. Lower Rio Grande Airshed—Potential air quality impacts by alternative

Lower Rio Grande Motorized Miles/Acres with potential to contribute to fugitive dust and add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	234			340		
Alternative C	196	-38	-16%	285	-55	-16%
Alternative D	155	-79	-34%	226	-114	-34%
Alternative E	146	-88	-38%	212	-128	-38%
Alternative F	179	-55	-24%	261	-79	-23%
Alternative G	179	-55	-24%	261	-79	-23%

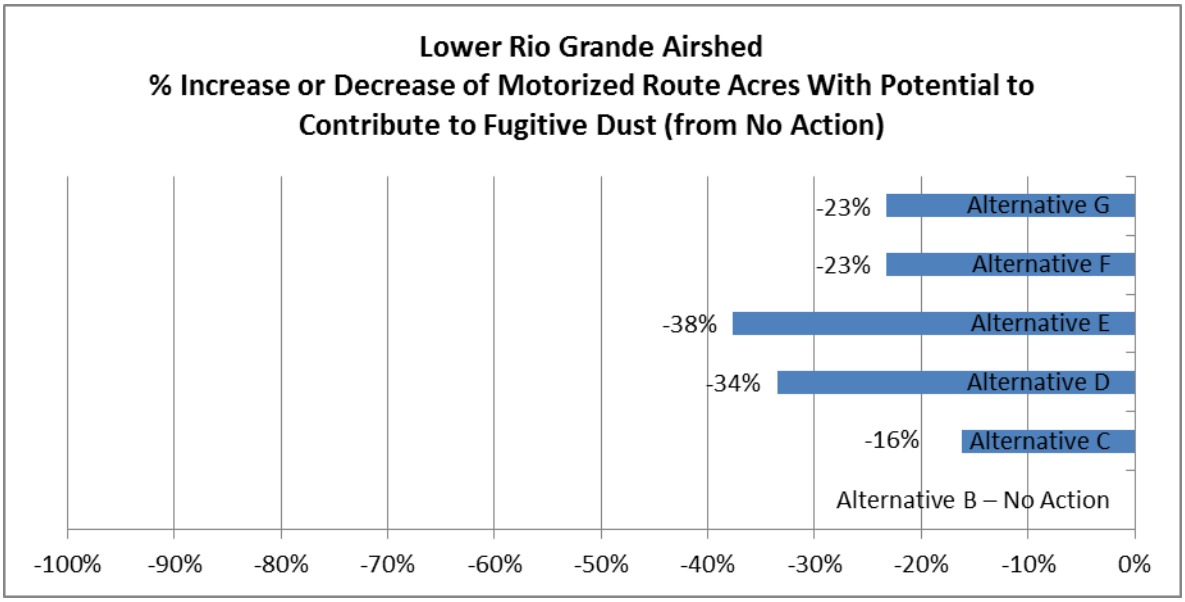

Figure A3. Lower Rio Grande Airshed – Percentage increase or decrease of motorized route acres with potential to contribute to fugitive dust (from no action)

Table A4. Southwestern Closed Airshed—Potential air quality impacts by alternative

Southwestern Closed Motorized Miles/Acres with potential to contribute to fugitive dust and add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	267			397		
Alternative C	302	35	13%	406	9	2%
Alternative D	199	-68	-25%	298	-99	-25%
Alternative E	160	-107	-40%	243	-154	-39%
Alternative F	222	-45	-17%	333	-64	-16%
Alternative G	222	-45	-17%	332	-65	-16%

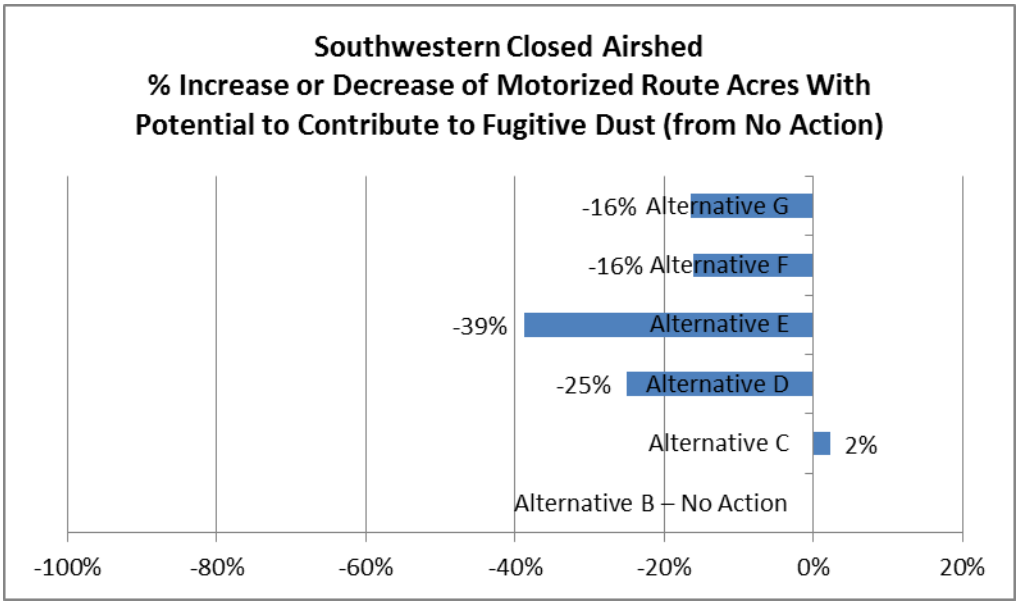

Figure A4. Southwestern Closed – Percentage increase or decrease of motorized route acres with potential to contribute to fugitive dust (from no action)

Table A5. Western Closed Airshed—Potential air quality impacts by alternative

Western Closed Motorized Miles/Acres with potential to contribute to fugitive dust and add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	330			494		
Alternative C	327	-3	-1%	489	-5	-1%
Alternative D	234	-96	-29%	353	-141	-29%
Alternative E	188	-142	-43%	286	-208	-42%
Alternative F	255	-75	-23%	384	-110	-22%
Alternative G	250	-80	-24%	378	-116	-23%

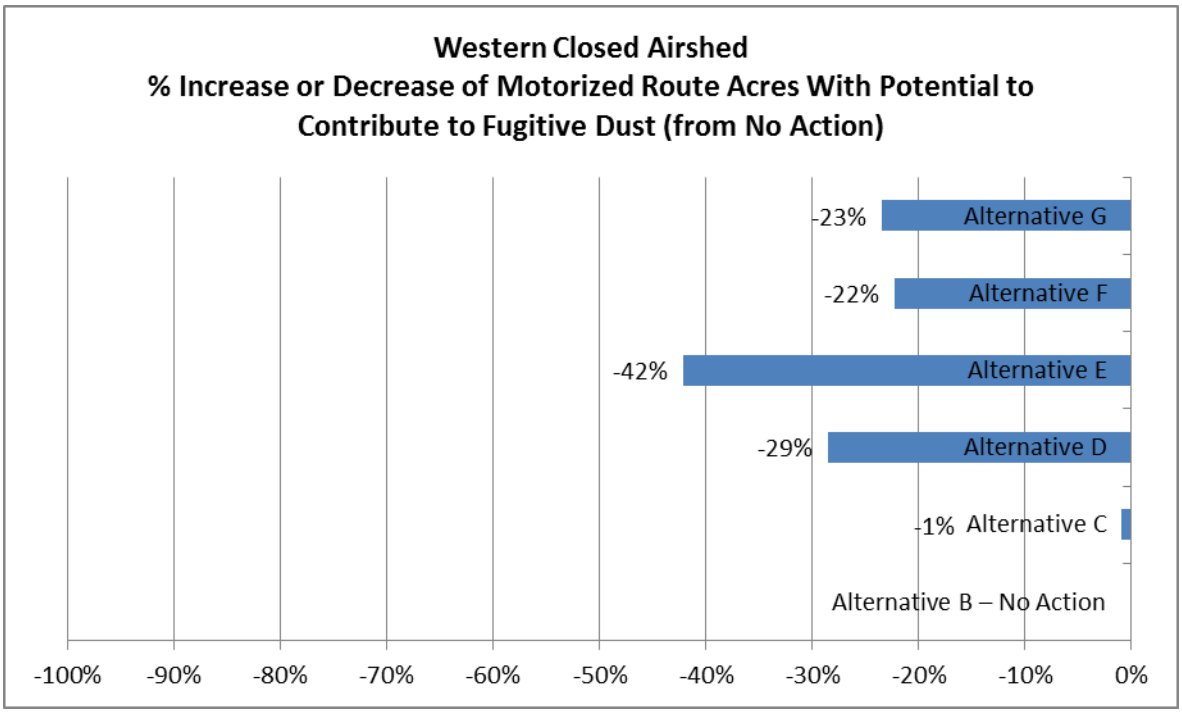

Figure A5. Western Closed Airshed – Percentage increase or decrease of motorized route acres with potential to contribute to fugitive dust (from no action)

Motorized Miles/Acres Adjacent to Wilderness Areas

Table A6. Miles/Acres of Motorized Routes within 1 Mile of all Wilderness Airsheds (Class I and II)

Motorized Miles/Acres within 1 mile of all Wilderness airsheds -- potential to contribute to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	265			407		
Alternative C	263	-2	-1%	403	-4	-1%
Alternative D	216	-49	-18%	336	-71	-17%
Alternative E	183	-82	-31%	288	-119	-29%
Alternative F	239	-26	-10%	369	-38	-9%
Alternative G	240	-25	-9%	370	-37	-9%

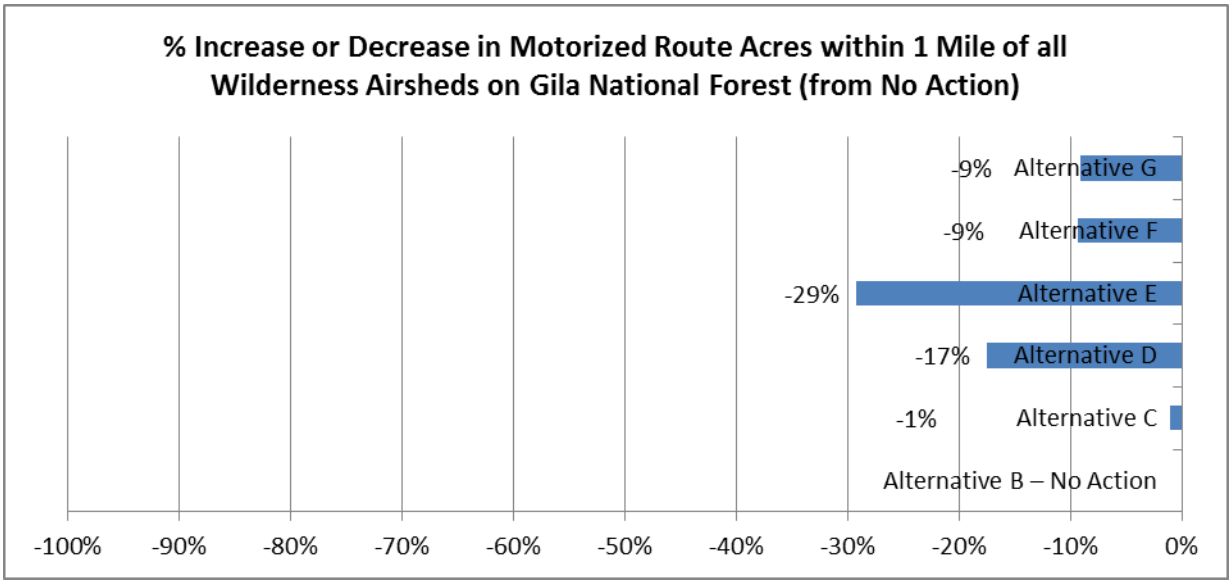

Figure A6. Percentage increase or decrease in motorized route acres within 1 mile of all wilderness airsheds on Gila National Forest (from no action)

Table A7. Miles/acres of motorized routes within 1 mile of Gila Wilderness Class I Airshed

Motorized Miles/Acres within 1 mile of Gila Wilderness -- potential to contribute to add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	162			250		
Alternative C	159	-3	-2%	245	-5	-2%
Alternative D	130	-32	-20%	203	-47	-19%
Alternative E	110	-52	-32%	175	-75	-30%
Alternative F	143	-19	-12%	221	-29	-12%
Alternative G	142	-20	-12%	221	-29	-12%

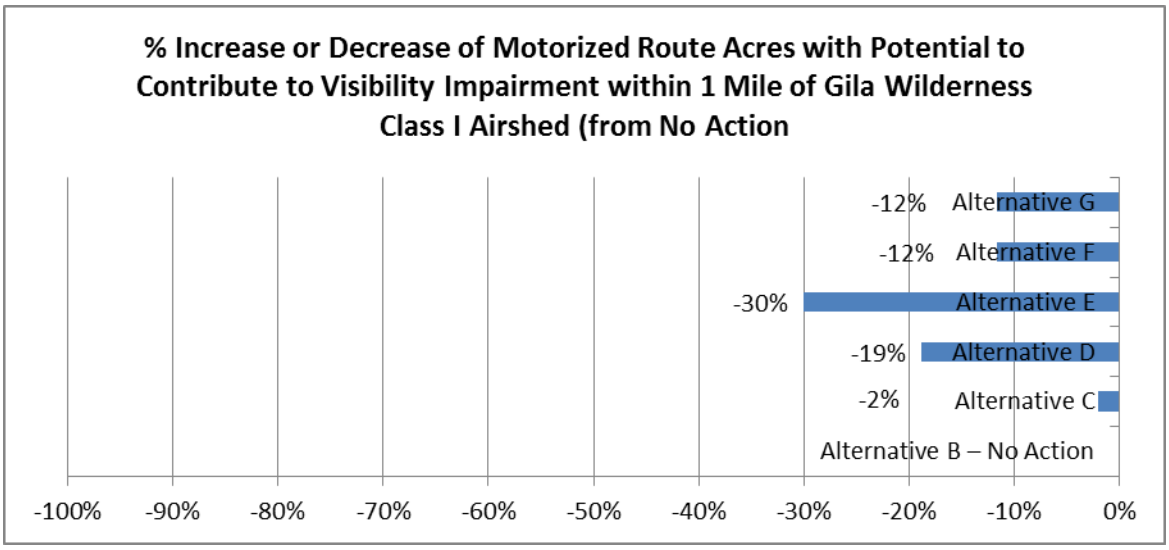

Figure A7. Percentage increase or decrease of motorized route acres with potential to contribute to visibility impairment within 1 mile of Gila Wilderness Class I Airshed (from no action)

Table A8. Miles/acres of motorized routes within 1 mile of Aldo Leopold Wilderness Class II Airshed

Motorized Miles/Acres within 1 mile of Aldo Leopold Wilderness -- potential to contribute to add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	82			126		
Alternative C	79	-3	-4%	123	-3	-2%
Alternative D	61	-21	-26%	96	-30	-24%
Alternative E	53	-29	-35%	84	-42	-33%
Alternative F	73	-9	-11%	113	-13	-10%
Alternative G	73	-9	-11%	113	-13	-10%

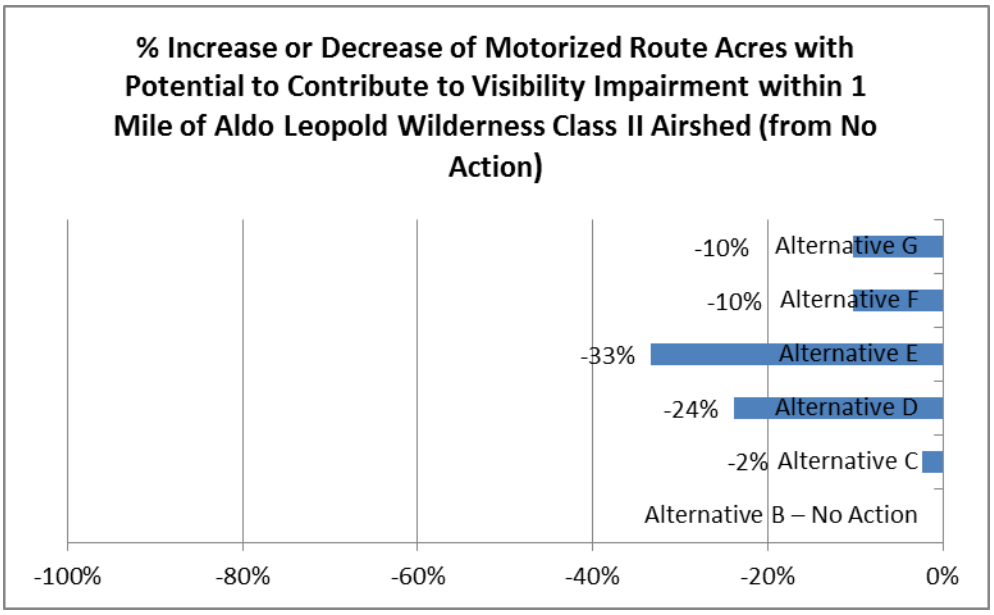

Figure A8. Percentage increase or decrease of motorized route acres with potential to contribute to visibility impairment within 1 mile of Aldo Leopold Wilderness Class II Airshed (from no action)

Table A9. Miles/acres of motorized routes within 1 mile of Blue Range Wilderness Class II Airshed

Motorized Miles/Acres within 1 mile of Blue Range Wilderness -- potential to contribute to add to visibility impairment	Miles	Change in Miles from No Action	% Increase or decrease in Miles from No Action	Acres	Change in Acres from No Action	% Increase or decrease in Acres from No Action
Alternative B – No Action	21			31		
Alternative C	24	3	14%	36	5	16%
Alternative D	24	3	14%	36	5	16%
Alternative E	20	-1	-5%	30	-1	-3%
Alternative F	24	3	14%	35	4	13%
Alternative G	24	3	14%	36	5	16%

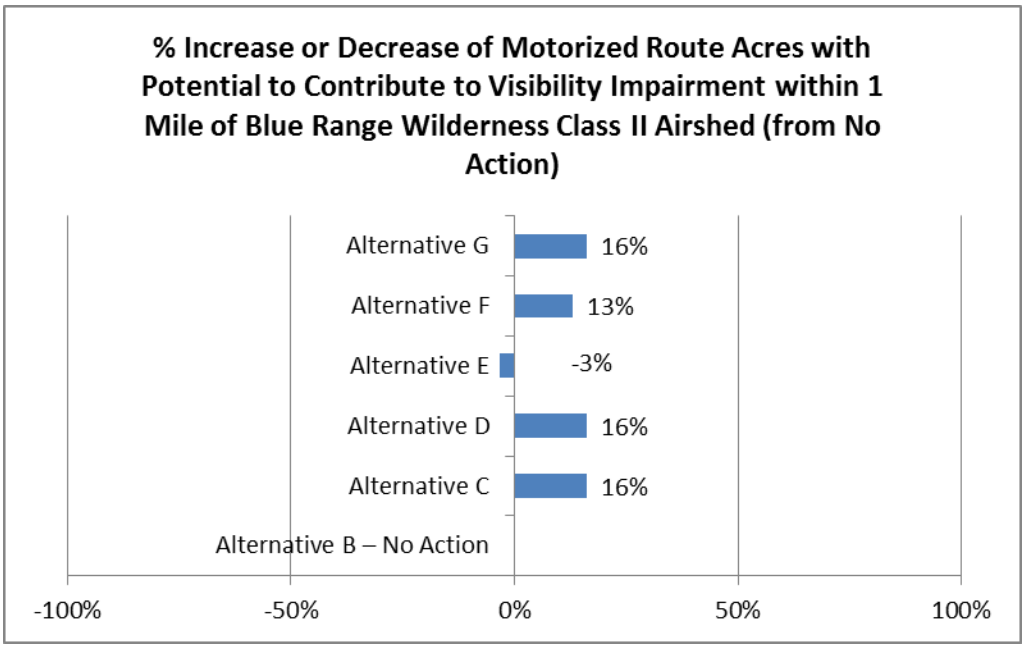

Figure A9. Percentage increase or decrease of motorized route acres with potential to contribute to visibility impairment within 1 mile of Blue Range Wilderness Class II Airshed (from no action)

Motorized Dispersed Recreation and Motorized Area Acres by Airshed

Table A10. Motorized dispersed recreation and motorized area acres forestwide

Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	2,443,368		
Alternative C	108,207	-2,335,161	-96%
Alternative D	84,388	-2,358,980	-97%
Alternative E	0	-2,443,368	-100%
Alternative F	101,942	-2,341,426	-96%
Alternative G	94,035	-2,349,333	-96%

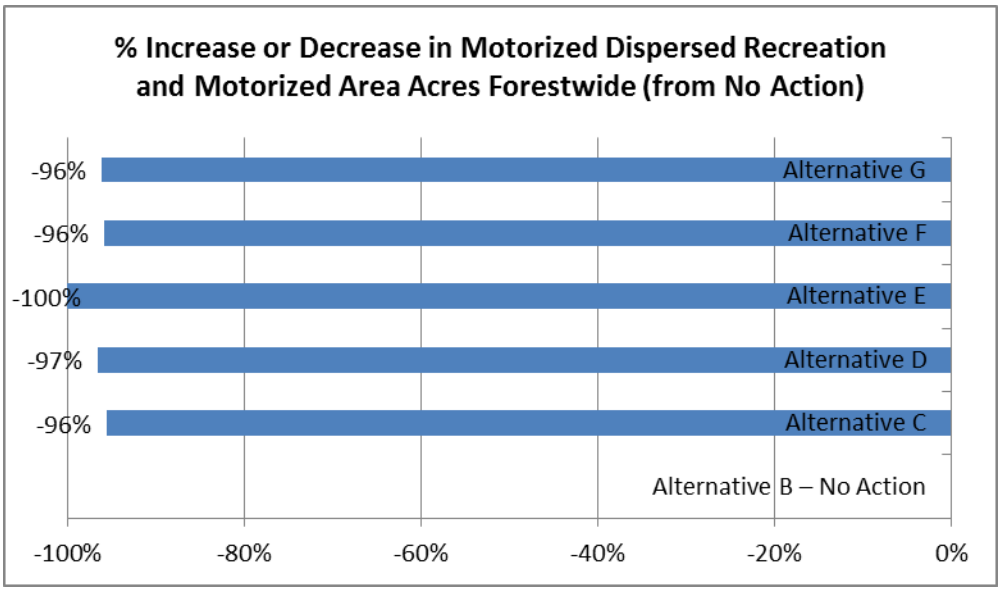

Figure A10. Percentage increase or decrease in motorized dispersed recreation and motorized area acres forestwide (from no action)

Table A11. Motorized dispersed recreation and motorized area acres In Lower Colorado River Airshed

Lower Colorado River Airshed - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	1,935,791		
Alternative C	91,131	-1,844,660	-95%
Alternative D	70,773	-1,865,018	-96%
Alternative E	0	-1,935,791	-100%
Alternative F	84,873	-1,850,918	-96%
Alternative G	77,724	-1,858,067	-96%

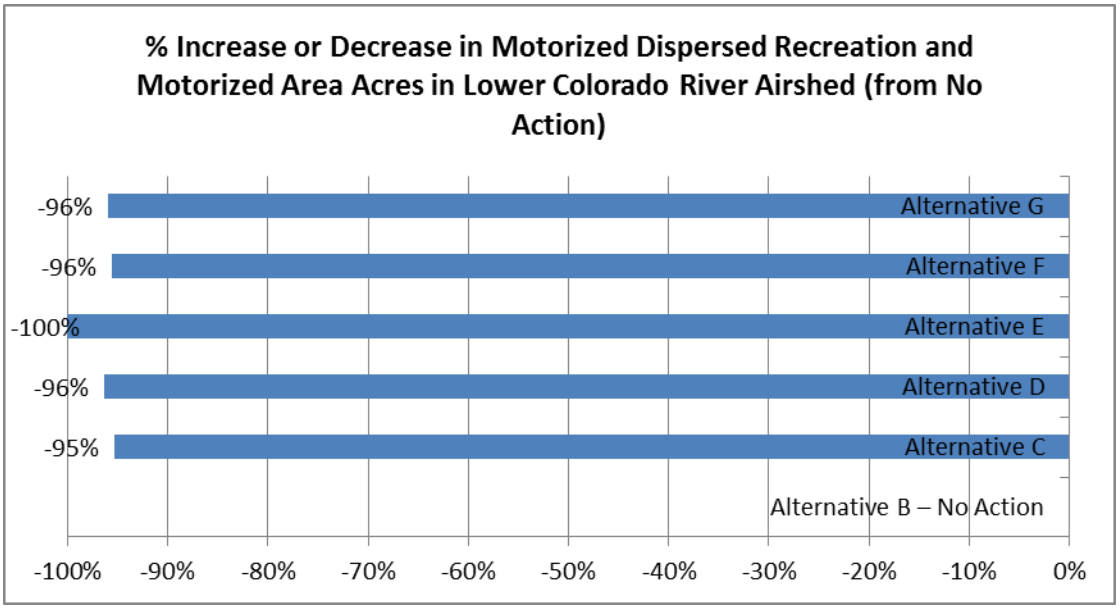

Figure A11. Percentage increase or decrease in motorized dispersed recreation and motorized area acres in Lower Colorado River Airshed (from no action)

Table A12. Motorized dispersed recreation and motorized area acres In Lower Rio Grande Airshed

Lower Rio Grande Airshed - Motorized Dispersed Recreation and Motorized Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	203,795		
Alternative C	2,123	-201,672	-99%
Alternative D	1,592	-202,203	-99%
Alternative E	0	-203,795	-100%
Alternative F	2,123	-201,672	-99%
Alternative G	2,123	-201,672	-99%

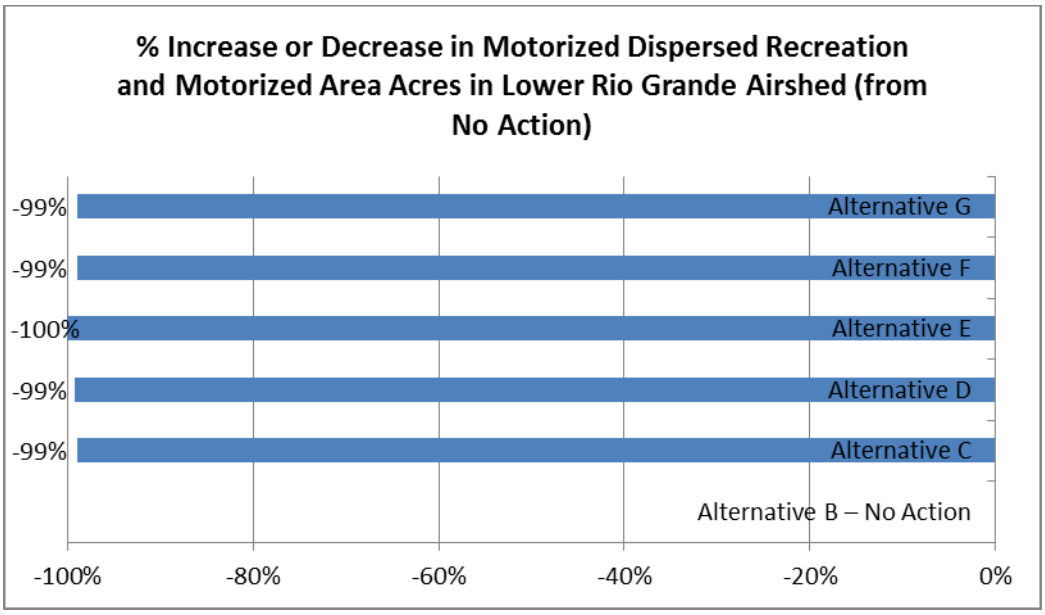

Figure A12. Percentage increase or decrease in motorized dispersed recreation and motorized area acres in Lower Rio Grande Airshed (from no action)

Table A13. Motorized dispersed recreation and motorized area acres In Southwestern Closed Airshed

Southwestern Closed Airshed - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	172,495		
Alternative C	6,611	-165,884	-96%
Alternative D	5,705	-166,790	-97%
Alternative E	0	-172,495	-100%
Alternative F	6,551	-165,944	-96%
Alternative G	6,551	-165,944	-96%

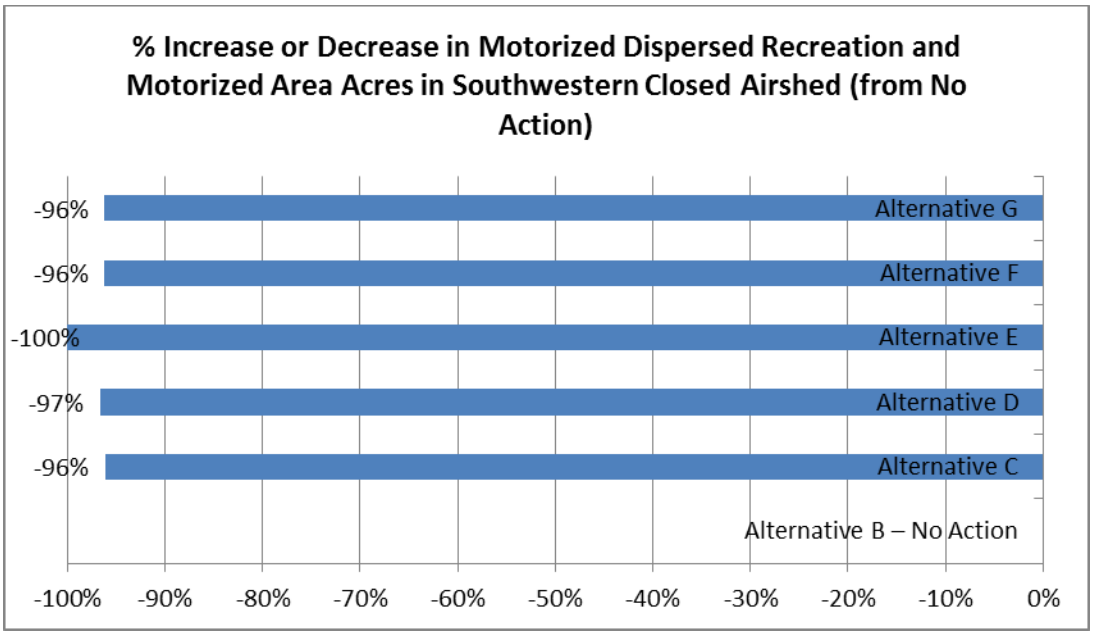

Figure A13. Percentage increase or decrease in motorized dispersed recreation and motorized area acres in Southwestern Closed Airshed (from No Action)

Table A14. Motorized dispersed recreation and motorized area acres in Western Closed Airshed

Western Closed Airshed - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	131,288		
Alternative C	8,341	-122,947	-94%
Alternative D	6,318	-124,970	-95%
Alternative E	0	-131,288	-100%
Alternative F	8,395	-122,893	-94%
Alternative G	7,637	-123,651	-94%

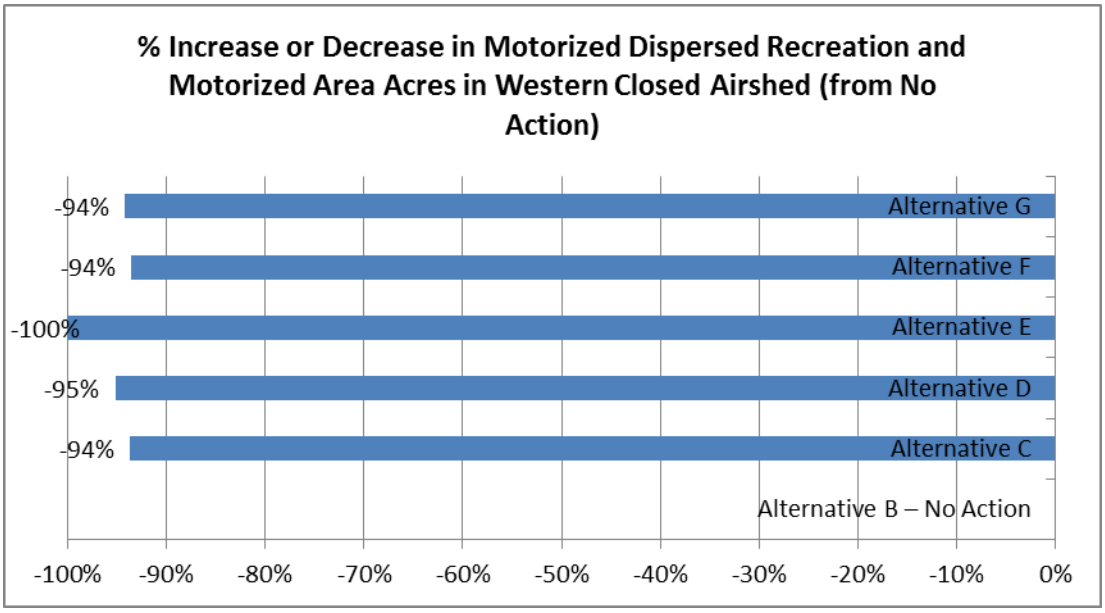

Figure A14. Percentage increase or decrease in motorized dispersed recreation and motorized area acres in Western Closed Airshed (from no action)

Motorized Dispersed Recreation and Motorized Area Acres Adjacent to Wilderness Areas

Table A15. Motorized dispersed recreation and area acres within 1 mile all wilderness areas (Class I and II)

Within 1 Mile all Wilderness Areas - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	179,318		
Alternative C	8,238	-171,080	-95%
Alternative D	7,275	-172,043	-96%
Alternative E	0	-179,318	-100%
Alternative F	8,270	-171,048	-95%
Alternative G	7,848	-171,470	-96%

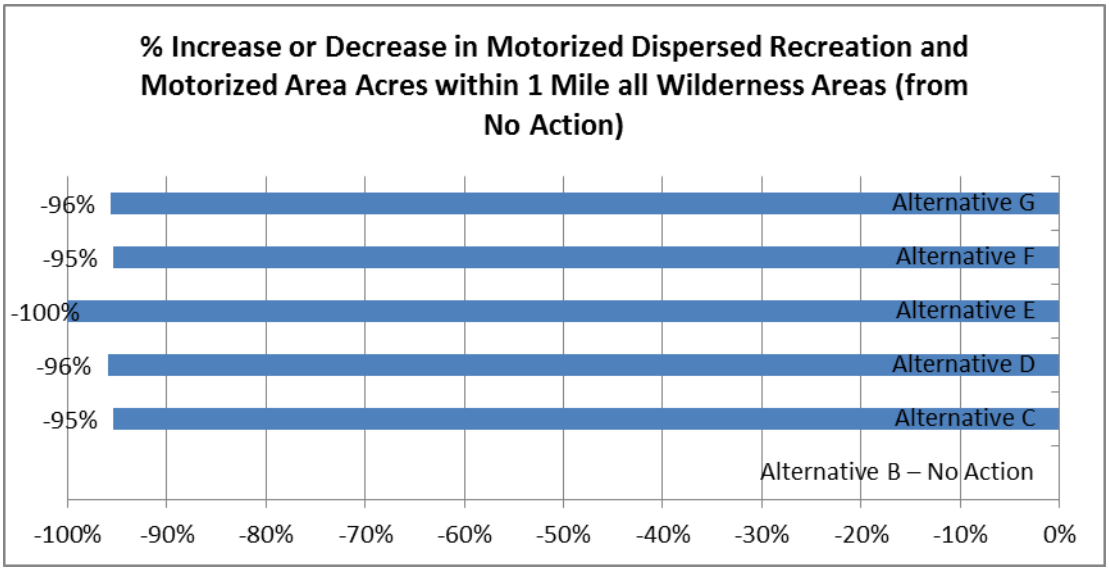

Figure A15. Percentage increase or decrease in motorized dispersed recreation and motorized area acres within 1 mile all wilderness areas (from no action)

Table A16. Motorized dispersed recreation and motorized area acres within 1 mile Gila Wilderness (Class I)

Within 1 Mile Gila Wilderness - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	97,520		
Alternative C	4,887	-92,633	-95%
Alternative D	4,423	-93,097	-95%
Alternative E	0	-97,520	-100%
Alternative F	919	-96,601	-99%
Alternative G	4,671	-92,849	-95%

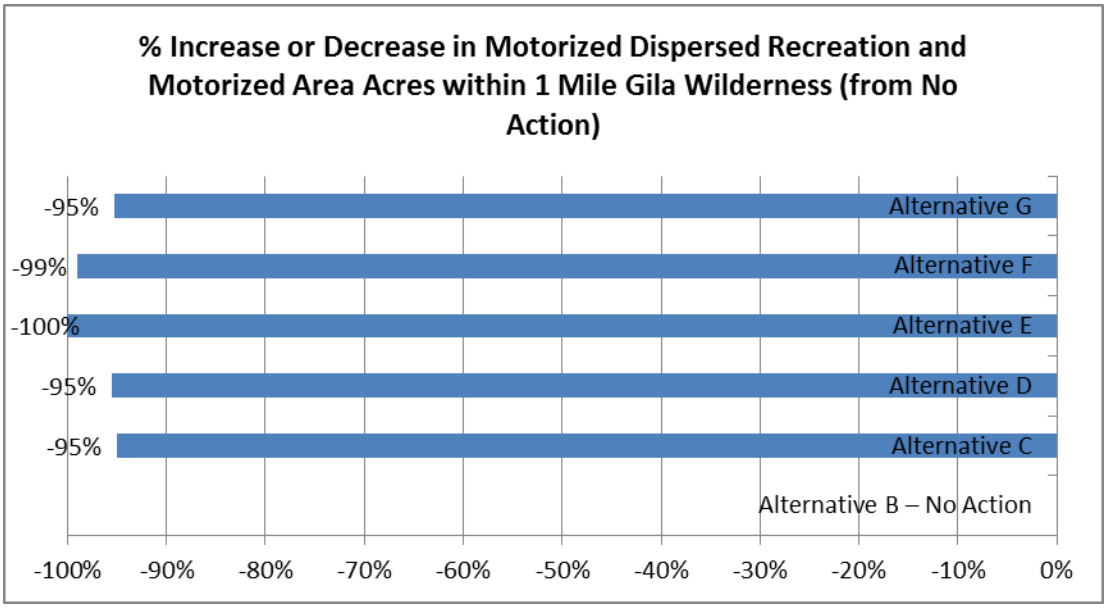

Figure A16. Percentage increase or decrease in motorized dispersed recreation and motorized area acres within 1 mile Gila Wilderness (from no action)

Table A17. Motorized dispersed recreation and motorized area acres within 1 mile Aldo Leopold Wilderness (Class II)

Within 1 Mile Aldo Leopold Wilderness - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	62,776		
Alternative C	2,939	-59,837	-95%
Alternative D	2,613	-60,163	-96%
Alternative E	0	-62,776	-100%
Alternative F	2,939	-59,837	-95%
Alternative G	2,939	-59,837	-95%

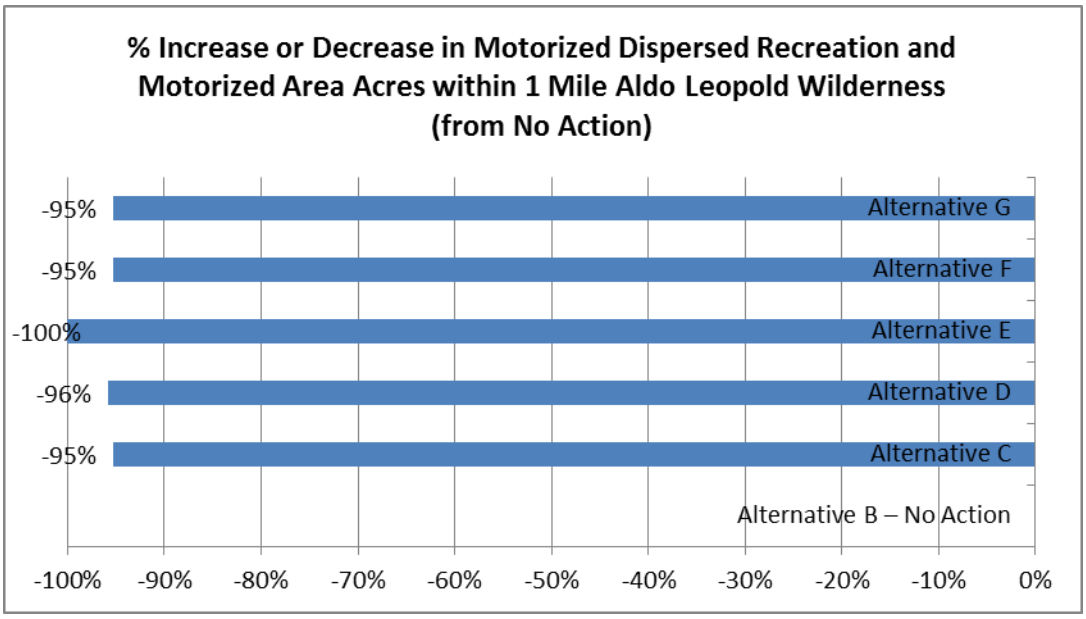

Figure A17. Percentage increase or decrease in motorized dispersed recreation and motorized area acres within 1 mile Aldo Leopold Wilderness (from no action)

Table A18. Motorized dispersed recreation and motorized area acres within 1 mile Blue Range Wilderness (Class II)

Within 1 Mile Blue Range Wilderness - Motorized Dispersed Recreation and Motorized Area Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	19,022		
Alternative C	412	-18,610	-98%
Alternative D	238	-18,784	-99%
Alternative E	0	-19,022	-100%
Alternative F	412	-18,610	-98%
Alternative G	238	-18,784	-99%

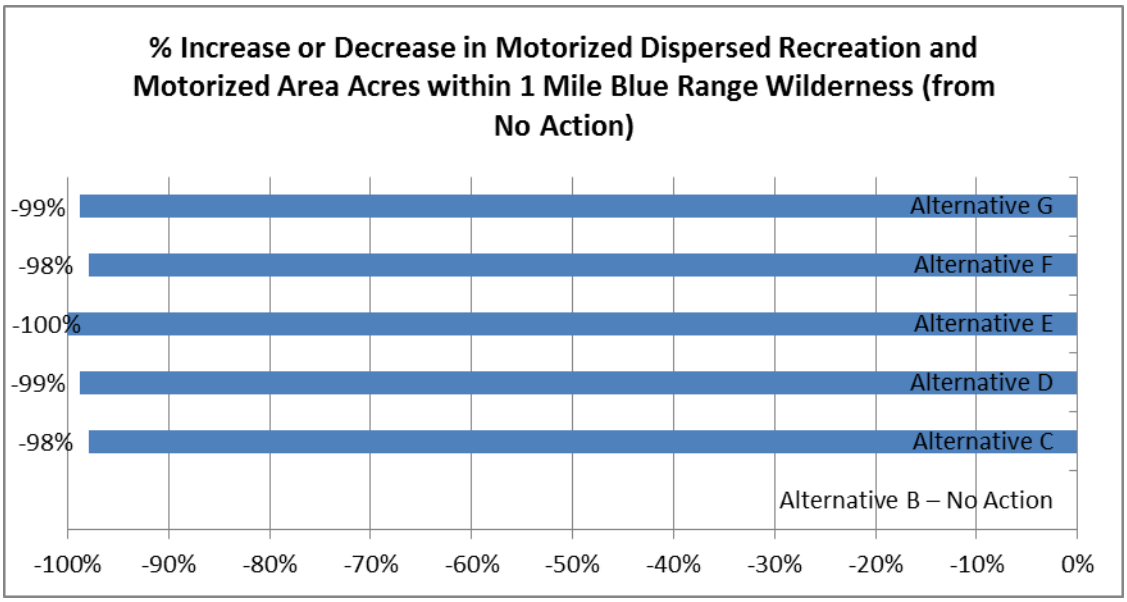

Figure A18. Percentage increase or decrease in motorized dispersed recreation and motorized area acres within 1 mile Blue Range Wilderness (from no action)

Motorized Big Game Retrieval Acres by Airshed

Table A19. Forestwide motorized big game retrieval acres

Forestwide - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	2,443,368		
Alternative C	2,078,660	-364,708	-15%
Alternative D	84,388	-2,358,980	-97%
Alternative E	0	-2,443,368	-100%
Alternative F	1,506,574	-936,794	-38%
Alternative G	94,008	-2,349,360	-96%

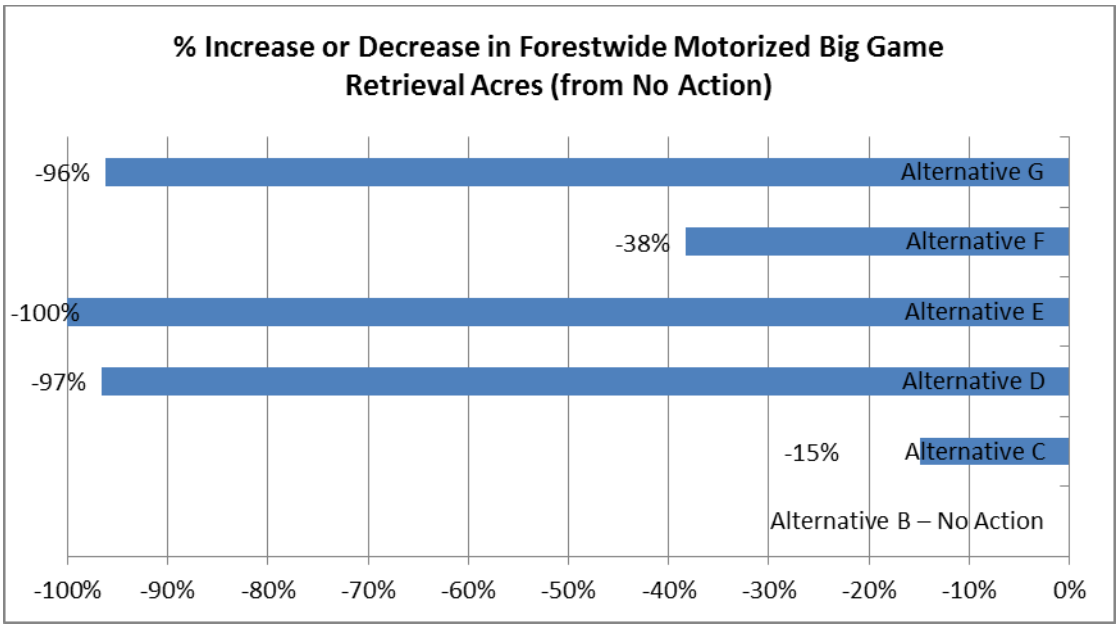

Figure A19. Percentage increase or decrease in forestwide motorized big game retrieval acres (from no action)

Table A20. Lower Colorado River Airshed - Motorized big game retrieval acres

Lower Colorado River Airshed - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	1,935,791		
Alternative C	1,712,467	-730,901	-30%
Alternative D	70,773	-2,372,595	-97%
Alternative E	0	-2,443,368	-100%
Alternative F	1,274,905	-1,168,463	-48%
Alternative G	77,700	-2,365,668	-97%

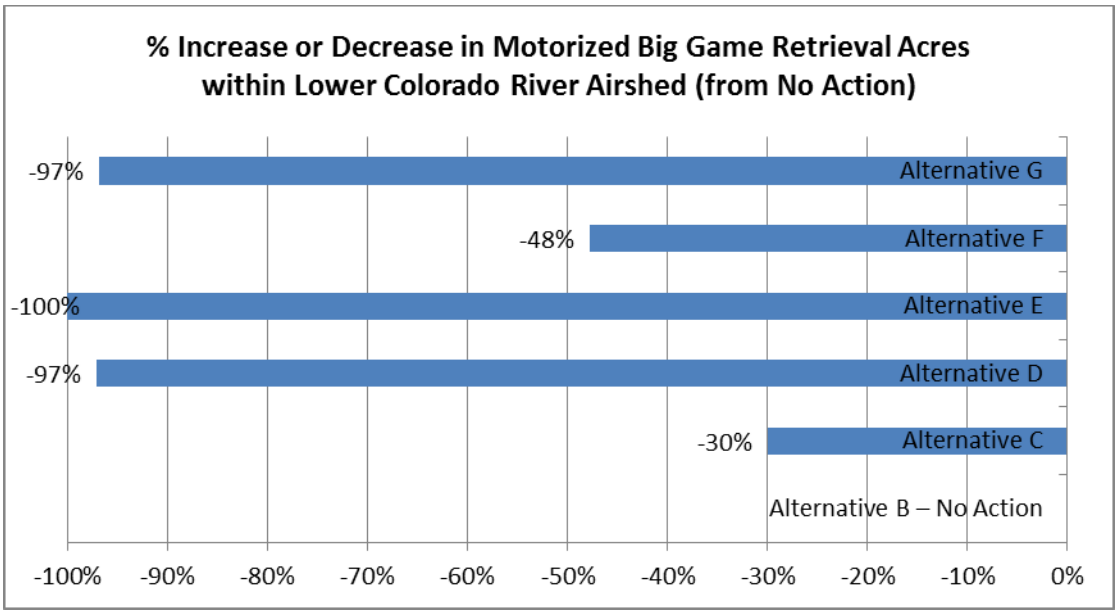

Figure A20. Percentage increase or decrease in motorized big game retrieval acres within Lower Colorado River Airshed (from no action)

Table A21. Lower Rio Grande Airshed - Motorized big game retrieval acres

Lower Rio Grande Airshed - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	203,795		
Alternative C	123,690	-80,105	-39%
Alternative D	1,592	-202,203	-99%
Alternative E	0	-203,795	-100%
Alternative F	67,460	-136,335	-67%
Alternative G	2,123	-201,672	-99%

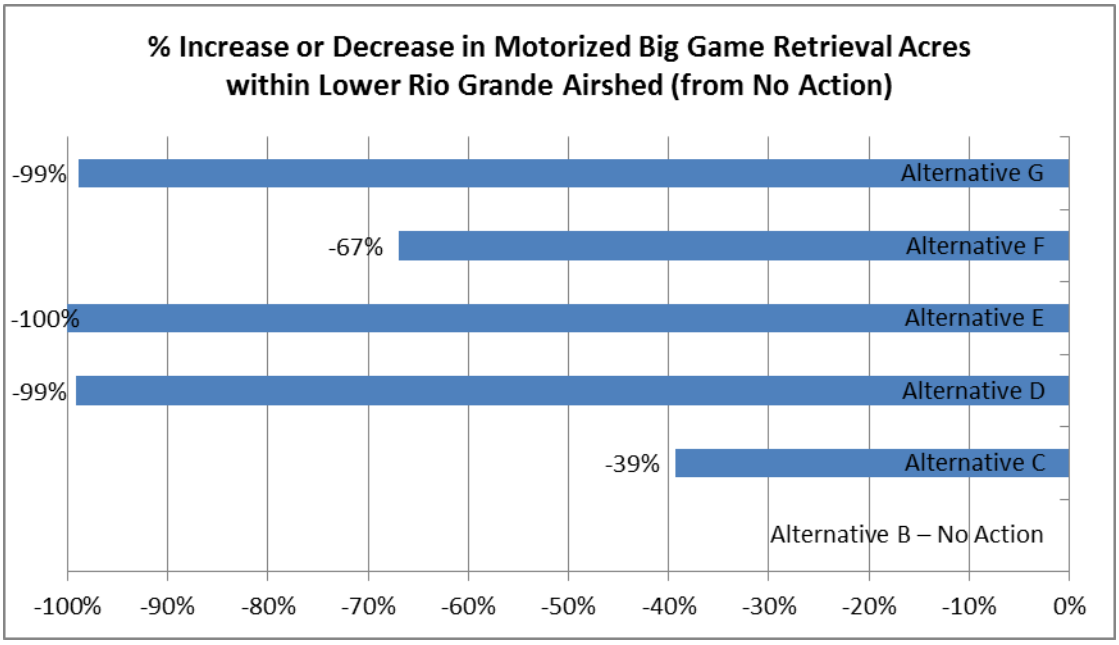

Figure A21. Percentage increase or decrease in motorized big game retrieval acres within Lower Rio Grande Airshed (from no action)

Table A22. Southwestern Closed Airshed - Motorized big game retrieval acres

Southwestern Closed - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	172,495		
Alternative C	120,877	-82,918	-41%
Alternative D	5,705	-198,090	-97%
Alternative E	0	-203,795	-100%
Alternative F	70,783	-133,012	-65%
Alternative G	6,549	-197,246	-97%

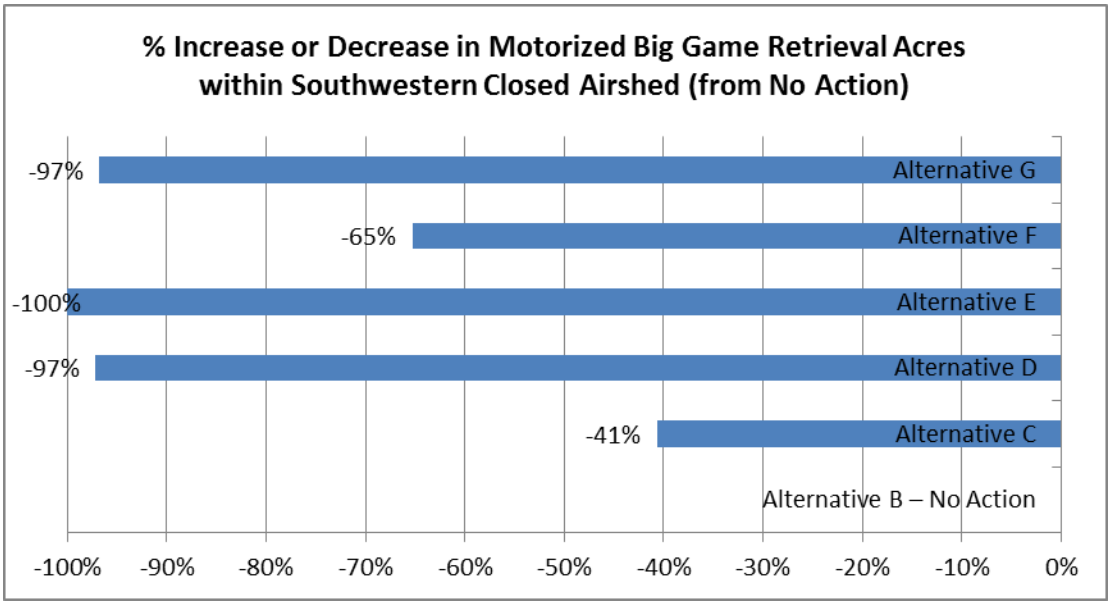

Figure A22. Percentage increase or decrease in motorized big game retrieval acres within Southwestern Closed Airshed (from no action)

Table A23. Western Closed Airshed - Motorized big game retrieval Acres

Western Closed Airshed - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	131,288		
Alternative C	121,627	-9,661	-7%
Alternative D	6,318	-124,970	-95%
Alternative E	0	-131,288	-100%
Alternative F	93,427	-37,861	-29%
Alternative G	7,636	-123,652	-94%

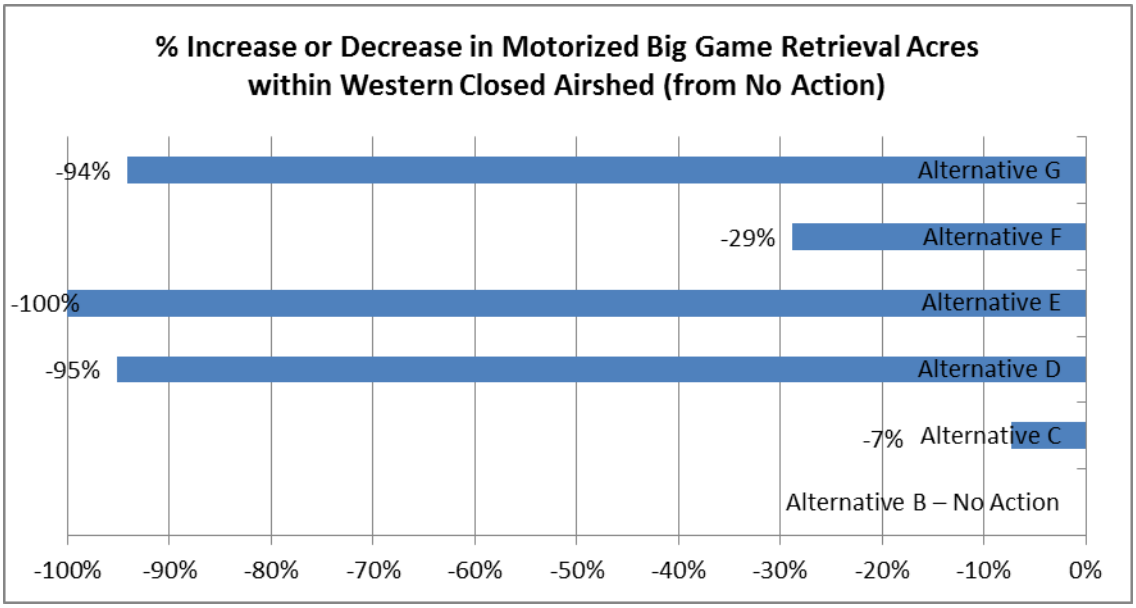

Figure A23. Percentage increase or decrease in motorized big game retrieval acres within Western Closed Airshed (from no action)

Motorized Big Game Retrieval Areas Adjacent to Wilderness

Table A24. Motorized big game retrieval acres within 1 mile all wilderness areas (Class I and II)

Within 1 Mile all Wilderness Areas - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	179,318		
Alternative C	141,438	-37,880	-21%
Alternative D	7,275	-172,043	-96%
Alternative E	0	-179,318	-100%
Alternative F	100,613	-78,705	-44%
Alternative G	7,844	-171,474	-96%

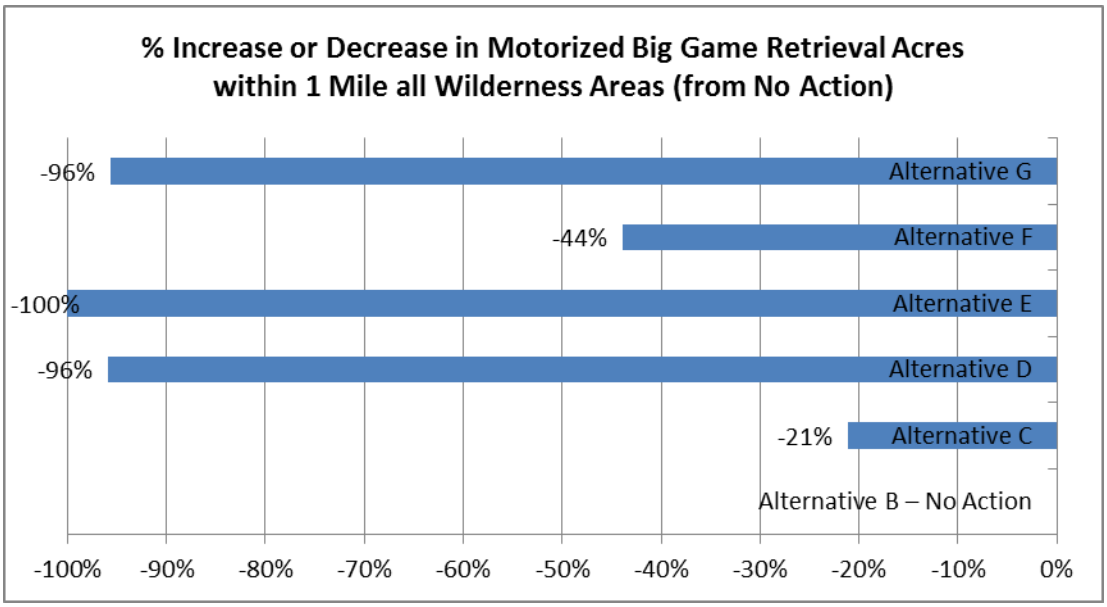

Figure A24. Percentage increase or decrease in motorized big game retrieval acres within 1 mile all wilderness areas (from no action)

Table A25. Motorized big game retrieval within 1 mile Gila Wilderness (Class I)

Within 1 Mile Gila Wilderness - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	97,520		
Alternative C	83,320	-14,200	-15%
Alternative D	4,423	-93,097	-95%
Alternative E	0	-97,520	-100%
Alternative F	63,021	-34,499	-35%
Alternative G	4,667	-92,853	-95%

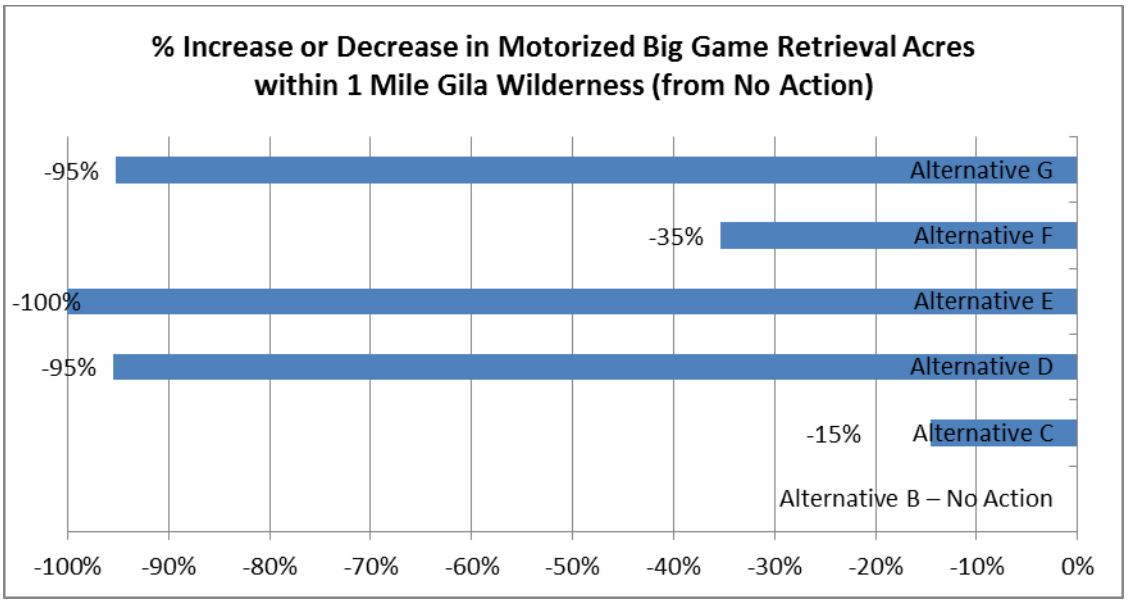

Figure A25. Percentage increase or decrease in motorized big game retrieval acres within 1 mile Gila Wilderness (from no action)

Table A26. Motorized big game retrieval acres within 1 mile Aldo Leopold Wilderness (Class II)

Within 1 Mile Aldo Leopold Wilderness - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	62,776		
Alternative C	39,654	-23,122	-37%
Alternative D	2,613	-60,163	-96%
Alternative E	0	-62,776	-100%
Alternative F	24,681	-38,095	-61%
Alternative G	2,939	-59,837	-95%

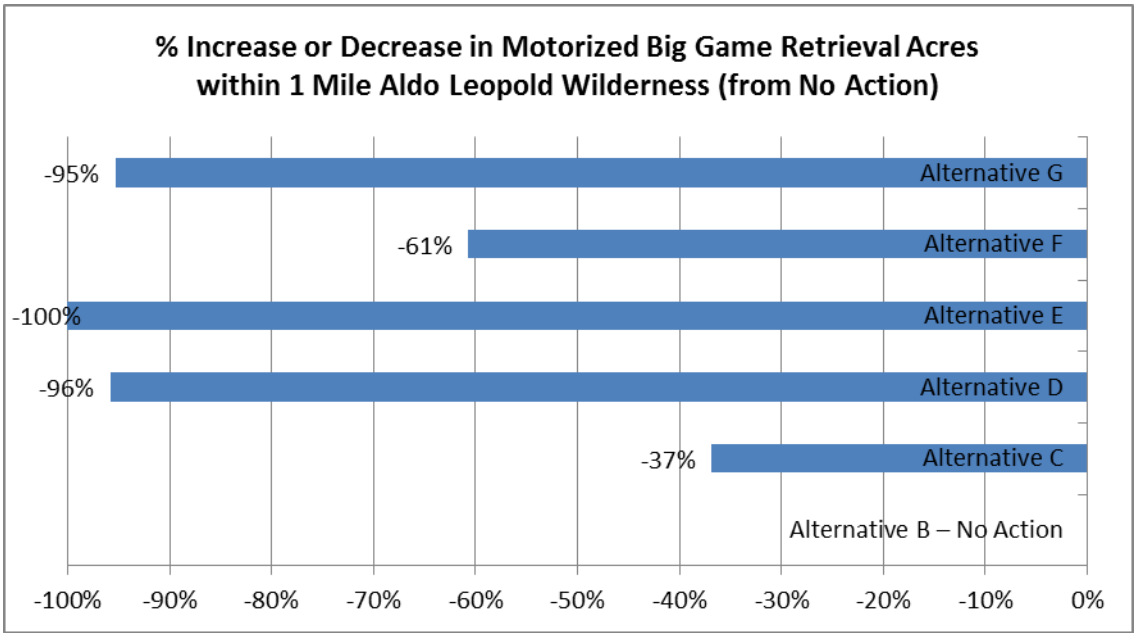

Figure A26. Percentage increase or decrease in motorized big game retrieval acres within 1 mile Aldo Leopold Wilderness (from no action)

Table A27. Motorized big game retrieval acres within 1 mile blue range wilderness (Class II)

Within 1 Mile Blue Range Wilderness - Motorized Big Game Retrieval Acres with Potential to Contribute to Fugitive Dust and Add to Visibility Impairment	Acres	Change in Acres from No Action	% Increase or decrease from No Action
Alternative B – No Action	19,022		
Alternative C	18,463	-559	-3%
Alternative D	238	-18,784	-99%
Alternative E	0	-19,022	-100%
Alternative F	12,911	-6,111	-32%
Alternative G	238	-18,784	-99%

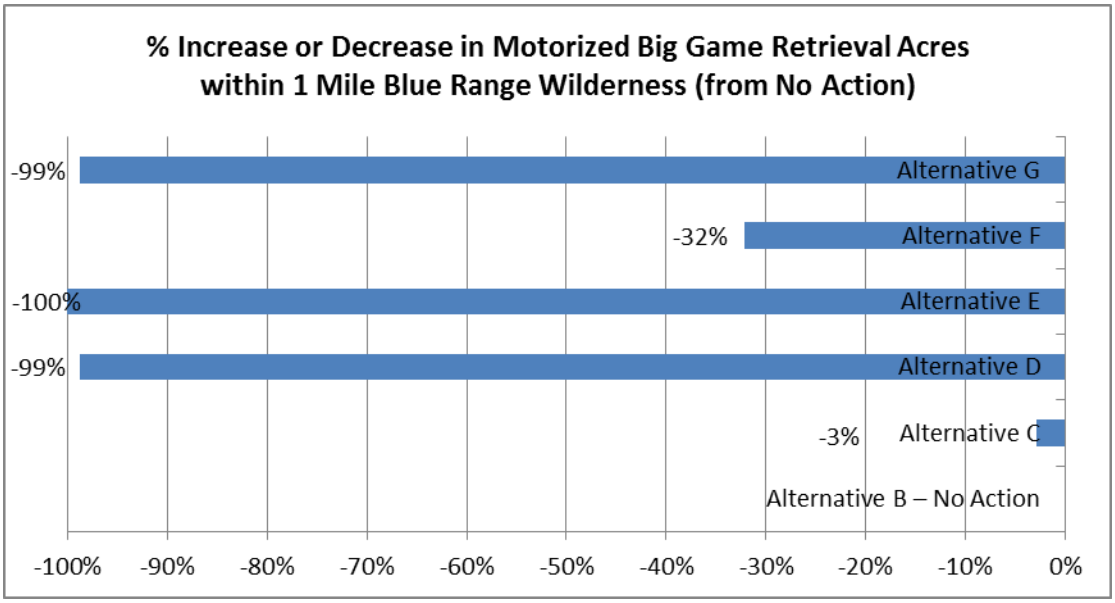

Figure A27. Percentage increase or increase in motorized big game retrieval acres within 1 mile Blue Range Wilderness (from no action)